

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS
TO
THE WATER QUALITY CONTROL PLAN
FOR THE SACRAMENTO RIVER AND
SAN JOAQUIN RIVER BASINS
FOR
BENEFICIAL USES
AT
WEST SQUAW CREEK
SHASTA COUNTY

STAFF REPORT
AND
FUNCTIONAL EQUIVALENT DOCUMENT



Final Report
July 2004

State of California
California Environmental Protection Agency
REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

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**Amendments To The Water Quality Control Plan For The Sacramento River And San
Joaquin River Basins For Beneficial Uses At West Squaw Creek
Shasta County**

Staff Report And Functional Equivalent Document

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Abbreviations

APS	Alkaline Producing System
ARD	Acid Rock Drainage
BAT	Best Available Technology
BMI	Benthic Macroinvertebrate
BMP	Best Management Practice
BPJ	Best Professional judgment
BPT	Best Practical Control Technology
CaCO ₃	Calcium Carbonate
Cd	Cadmium
CFR	Code of Federal Regulations
CSBP	California Stream Bioassessment Procedure
CTR	California Toxics Rule
Cu	Copper
CuFeS ₂	Chalcopyrite
CWA	Clean Water Act
DFG	California Department of Fish and Game
DWR	California Department of Water Resources
EB	Early Bird Tributary Stream Segment
EPT	Ephemeroptera (mayfly), Plecoptera (stonefly) and Trichoptera (Caddisfly) insect orders
ESA	Endangered Species Act
Fe ²⁺	Ferrous Iron
Fe ³⁺	Ferric Iron
Fe ₂ O ₃	Hematite
FeOOH	Goethite
FeS ₂	Pyrite
FR	Federal Register
gpm	Gallons per Minute
GPS	Global Positioning System
HDPE	High-Density Polyethylene
lb/day	Pounds per Day
LC ₅₀	Lethal Concentration (50 percent survival)
mg/l	Milligrams per Liter
mg/kg	Milligrams per Kilogram
MRRC	Mining Remedial Recovery Corporation
MSL	Mean Sea Level
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
NTR	National Toxics Rule
OAL	Office of Administrative Law
PA	PA Tributary Stream Segment
psi	Pounds per Square Inch

Abbreviations (continued)

SO ₄ ⁺²	Sulfate
RWQCB	Regional Water Quality Control Board
SRB	Sulfate Reducing Bacteria
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
UAA	Use Attainability Analysis
USFWS	United States Fish and Wildlife Service
ug/l	Micrograms per Liter
umhos/cm	Micromhos per Centimeter
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDR	Waste Discharge Requirement
WEIL	Weil Tributary Stream Segment
WIN	Windy Creek Stream Segment
WSC	West Squaw Creek Stream Segment
Zn	Zinc
ZnS	Sphalerite

Glossary

Abandoned Mine - Previously mined area and associated waste units, processing plants and other facilities that have not been reclaimed.

Acid - Substance that has a PH of less than 7, which is neutral. Specifically, an acid has more free hydrogen ions (H+) than hydroxyl ions (OH).

Anadromous Fish - Fish that spawn in freshwater and spend a portion of their lives in the ocean.

ARD - Acid rock drainage is drainage that occurs as a result of oxidation of sulfide materials (usually pyrite or iron sulfide) contained in rock that is exposed to air and water. The oxidation of sulfides produces sulfuric acid and sulfate salts. The acid dissolves and leaches out minerals in the rock.

Adit - A nearly horizontal passage accessible from the surface for the purpose of working in or dewatering a mine.

Aerobic Organism - Organism that can utilize oxygen as the final electron acceptor during metabolism.

Alkalinity - Capacity of solutes in an aqueous system to neutralize acid.

Anaerobic Organism - Organisms that do not use oxygen as the final electron acceptor during metabolism, organisms that grow in the absence of air.

Anoxic - Absence of oxygen, dissolved oxygen concentrations are near zero.

Basin Plan - Water Quality Control Plan, Central Valley Region, Sacramento and San Joaquin River Basins, Fourth Edition, 1998.

BAT - Best available technology is used to describe the best and most stringent technology, treatment techniques, or other means available for controlling the water quality of point source discharge.

BMI - Benthic macroinvertebrates are stream-inhabiting organisms that spend at least part of their lives living in or on the stream bottom.

BMP - Best management practice is the practice or combination of practices that are determined to be the most effective, practical means of preventing or reducing the amount of pollution generated by nonpoint (and point) sources to levels compatible with water quality goals.

Glossary (continued)

Bulkhead Seal - Generally a concrete plug installed in an adit or tunnel to: 1) prevent access, and 2) re- establish the pre-mining hydrostatic pressure behind the seal.

Clean Water Act - The Federal Water Pollution Control Act, popularly known as the Clean Water Act, is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Originally enacted in 1948, the CWA was expanded numerous times until it was reorganized and expanded in 1972. It continues to be amended almost every year. The CWA is codified in the United States Code (33 USC 1251-1387). Regulations implementing the CWA are included in the Code of Federal Regulations (CFR).

Concentration - Mass of contaminant per unit volume of water generally expressed as milligrams per liter (mg/l) or micrograms per liter (ug/l), where 1 mg equals 10^{-6} kilograms and 1 ug equals 10^{-9} kilograms.

Disseminated Gossan - Leached, oxidized surface exposure of a weathered disseminated sulfide deposit.

Disseminated Sulfide Deposit - Low-grade metal sulfide ore disseminated throughout host rock.

Drift - Nearly horizontal underground passage excavated along a vein.

Gabion - Wire mesh box-shaped baskets that are available in variable sizes. These baskets are filled with non-acid forming rocks and placed to form the floor and walls of a channel.

Gangue - Mine waste, consisting of barren rock, as well as target minerals in concentrations too low for economic recovery, synonymous with waste rock.

Gossan - Leached, oxidized surface exposure of a weathered sulfide deposit.

Gossan Float - Fragments of gossan carried away from the exposed sulfide deposit.

Mass Loading - Mass of contaminant per unit time generally expressed as pound per day (lb/day), which is calculated by multiplying the measured concentration of the contaminant in ug/l, by the measured flow rate in gallons per minute (gpm), by a unit conversion factor of 0.00001198.

Massive Gossan - Leached, oxidized surface exposure of a weathered massive sulfide deposit.

Massive Sulfide - High grade metal sulfide ore generally occurring in lenses or large mass.

Nonpoint Source Pollution - Pollution from any source that is not considered a point source. Can be natural or human-caused.

Ore - Rocks or minerals that can be recovered at a profit. In its strictest sense, ore refers only to metals or metal-bearing minerals.

Oxidation - In common usage, oxidation is a reaction between a substance and oxygen. More precisely, oxidation is any reaction in which an atom loses an electron. The reaction does not have to involve oxygen.

Periphyton - Algae and associated microorganisms growing attached to any submerged surface.

Point Source Pollution - Any discernible, confined, and discrete conveyance. Including, but not limited to, pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may discharge.

Portal - Entrance to an adit or tunnel.

Reduction - Reduction is any reaction in which an atom gains an electron.

Stope - An underground excavation formed by the extraction of ore.

Sulfate Reducing Bacteria - Anaerobic bacteria that obtain the oxygen needed for metabolism by reducing sulfate (SO_4^{2-}) to hydrogen sulfide (H_2S) or elemental sulfur.

Sulfide - A metallic mineral containing sulfur such as pyrite (FeS_2), chalcopyrite (CuFeS_2) or sphalerite (ZnS).

Tailings - Residual material remaining after ore is processed.

TMDL - Total maximum daily load is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards.

Tributary - A smaller stream that flows into a larger stream.

Tunnel - A long passage in a mine that is open at both ends.

Vein - Mineral filling a fault or fracture,

Waste Rock - Mine waste, consisting of barren rock, as well as target minerals in concentrations too low for economic recovery.

Watershed - The land area that drains water to a particular stream, a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge.

1.0 INTRODUCTION

The Regional Water Quality Control Board, Central Valley Region (RWQCB) will consider whether to amend the Water Quality Control Plan for the Sacramento River and San Joaquin Rivers (Basin Plan) to dedesignate certain beneficial uses of West Squaw Creek, tributary to Lake Shasta, which has been significantly impacted by copper mining in the watershed. This Staff Report, prepared by and under the direction of the staff of the RWQCB constitutes the planning documentation required by the Porter-Cologne Water Quality Control Act (California Water Code (CWC) Division 7) to support amendments to the RWQCB's Basin Plans. The Staff Report also constitutes the Functional Equivalent Document required pursuant to the California Environmental Quality Act (CEQA) to evaluate the environmental impacts of the proposed Basin Plan amendments. The companion document, *Use Attainability Analyses, West Squaw Creek Watershed, Shasta County, California*, July 2004 is part of this Staff Report and contains the factual and technical data in support of the proposed Basin Plan amendment.

This section of the Staff Report summarizes the basin planning process, defines the purpose and need for amendments describes the proposed amendments, and defines the purpose and intended use of this Staff Report in the Basin Plan amendment process.

1.1 Background

1.1.1 Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins

A Water Quality Control Plan, or Basin Plan, is the basis for regulatory actions by RWQCBs that are to be taken for water quality control. Each of the nine RWQCBs in California has adopted one or more Basin Plans for its geographic region.

The preparation and adoption of a Basin Plan is required by CWC Section 13240 and the federal Clean Water Act (CWA). CWA Section 303 requires states to adopt water quality standards that consist of the designated uses of the navigable waters involved and the water quality criteria (referred to as "objectives" in California) for such waters based upon designated uses. A Basin Plan must consist of all of the following (CWC Sections 13240-13244):

- a) Beneficial uses to be protected;
- b) Water quality objectives;
- c) A program of implementation needed for achieving water quality objectives; and
- d) Surveillance and monitoring to evaluate the effectiveness of the program.

Basin Plans are adopted and amended by the Regional Boards using a structured process involving peer review, full public participation, state environmental review, and state and federal agency review and approval.

It is the intent of the State Water Resources Control Board (SWRCB) and RWQCBs to maintain the Basin Plans in an updated and readily available edition that reflects the current water quality control program. The Basin Plan for the Sacramento and San Joaquin River Basins was first adopted in 1975. In 1989, a second edition was published. The second edition incorporated all the amendments which had been adopted and approved since 1975, updated the Basin Plan to include new state policies and programs, restructured and edited the Basin Plan for clarity, and incorporated the results of triennial reviews conducted in 1984 and 1987. In 1994 a third edition was published incorporating all amendments adopted since 1989, including new state policies and programs, restructuring and editing the Basin Plan to make it consistent with other regional and state plans, and substantively amending the sections dealing with beneficial uses, objectives, and implementation programs. The current edition (Fourth Edition 1998) incorporates two new amendments adopted since 1994. The CWA requires the RWQCB to conduct a review every three years (the triennial review) to consider whether the Basin Plan should be revised and to set priorities for such revisions. The document *Issue List And Workplan For The 2002 Triennial Review Of The Water Quality Control Plan For The Sacramento and San Joaquin River Basins*, adopted by the RWQCB on 19 July 2002 in Resolution No. R5-2002-0126, identifies the need to specifically identify beneficial uses for tributary streams and water bodies that are not specifically listed in Table II-1 of the Basin Plan, as such water bodies may not have the same beneficial uses as the downstream listed water body

The United States Environmental Protection Agency (USEPA) must approve Basin Plan amendments that concern navigable waters of the United States, i.e., surface waters. Since publication of the Fourth Edition, the federal rules regarding USEPA approval of water quality standards have changed. When a state adopts a water quality standard that goes into effect under state law on or after May 30, 2000, it becomes the applicable water quality standard only after USEPA approval, unless the USEPA promulgates a more stringent water quality standard for that state, in which case the USEPA promulgated water quality standard is the applicable water quality standard for purposes of the CWA (65 FR 36046 codified at 40 CFR 131.21). This new regulation applies to all surface waters of the state.

1.1.2 Regulatory Authority and Mandates for Basin Plan Amendments

The SWRCB and the nine RWQCBs are the principal state agencies with regulatory responsibility for coordination and control of water quality. CWC Section 13240 requires the SWRCB to adopt and revise state policy for water quality control. Basin Plans adopted by the Regional Boards must conform to these policies.

Authority for each Regional Board to formulate and adopt Basin Plans and periodically review the plans is provided in Section 13240 of the Water Code. However, a Basin Plan does not become effective until approved by the State Board (Water Code Section 13245), and the Office of Administrative Law (OAL). If the amendment involves adopting or revising a standard which relates to surface water, it must also be approved by the USEPA [40 CFR 131.21] before it goes into effect.

CWC Section 303 requires states to adopt water quality standards for surface waters “...*from time to time*...” and “...*as appropriate*...” Standards consist of designated uses and criteria (referred to as “objectives” in California) to protect those uses. These requirements also are found in the Code of Federal Regulations (CFR), primarily 40 CFR 130 (which covers water quality planning and management) and 40 CFR 131 (which covers water quality standards).

Each Regional Board also must comply with the requirements of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) when amending the Basin Plan. The planning process for Basin Plans has been certified by the Secretary of Resources as a regulatory program pursuant to Public Resources Code Section 21080.5 (see Title 14 California Code of Regulation (CCR) Section 15251(g)). Pursuant to Public Resources Code section 21080.5(c), the Basin Plan planning process is exempt from the provisions of the CEQA that relate to preparation of Environmental Impact Reports and Negative Declarations. In lieu of compliance with those provisions of CEQA, Section 7 of this Staff Report (Environmental Review) satisfies the requirements of State Board Regulations for Implementation of CEQA, Exempt Regulatory Programs, which are found in, Title 23 CCR, Division 3, Chapter 27, Article 6, beginning at Section 3775.

1.1.3 Purpose and Need for the Proposed Revisions To The Basin Plan

Historic mines in the West Squaw Creek watershed are currently regulated in accordance with a National Pollutant Discharge Elimination System (NPDES) permit under the CWA issued to the owners of the mines ¹. This permit sets allowable discharge levels for point source discharges and receiving water limits and is enforced by the RWQCB. In accordance with the permit, metal loading (copper, cadmium and zinc) from point sources must be reduced by 99 percent, and receiving water concentrations must meet the numeric objectives identified in the Basin Plan for protection of the designated beneficial uses which include the protection of a WARM, COLD, and SPWN.

The source of the metals is from the oxidation of natural sulfide deposits which releases low pH, metal laden water, referred to as acid rock drainage (ARD) or acid mine drainage (AMD). These deposits were commonly mined as a source of copper and zinc in the late 1800s and early 1900s. The mining activity, consisting of digging tunnels into the ore deposits and extracting the ore, resulted in exposing the sulfide deposits to water and oxygen, thus increasing the production of ARD.

Some abandoned and historic mine sites, such as those in the West Squaw Creek drainage, are unique from other NPDES regulated discharges. Due to the remoteness and steepness of

¹The current owner of the abandoned mines in the West Squaw Creek drainage is Mining Remedial Recovery Corporation (MRRC). MRRC never conducted mining in the area, but became owners of the mines due to corporate acquisitions. MRRC as the owner of the property that caused the discharges of waste from point sources is the named responsible party of the NPDES permits.

the terrain in the vicinity of the mines, and the nature of the source areas (both point and non-point), many remedial technologies are not economically or technically feasible. Further, as remedial efforts are implemented to address the major discharges of metals to the watercourses, costs increase exponentially to address the remaining, generally smaller and more complex, sources. Despite continued remedial efforts, remaining diffuse non-point sources of ARD are impossible to locate and remediate, resulting in concentrations of metals in West Squaw Creek that will not support all the currently designated beneficial uses.

The Basin Plan at page II-2.00 states: “Existing and potential beneficial uses which currently apply to surface waters of the basins are presented in Figure II-1. The beneficial uses of any specifically identified water body generally apply to its tributary streams.” The Basin Plan does not specifically identify beneficial uses for West Squaw Creek, but does identify present and potential uses for Shasta Lake, to which West Squaw Creek is a tributary. The designated, but not necessarily existing beneficial uses for West Squaw Creek, using the tributary rule, include Municipal and Domestic Supply (MUN), Agricultural Irrigation (AGR), Hydropower Generation (POW), Contact and Non-Contact Recreation (REC1 and REC2), warm and cold Freshwater Habitat (WARM and COLD), Spawning (SPWN), and Wildlife Habitat (WILD)².

In its most recent triennial review of the Basin Plan, as required by the CWA, the RWQCB identified the need to further develop solutions to water quality regulation problems associated with ARD and mine remediation. The focus of this document and the associated Use Attainability Analysis (UAA) is to evaluate the existing water quality in West Squaw Creek, determine if current beneficial use designation are appropriate, determine whether stream specific changes to the currently applicable objectives for these parameters are appropriate, and, if so, propose and technically support such changes. This is consistent with the RWQCB’s basin planning priority.

The Basin Plan amendments proposed in this Staff Report consist of modifying the designated, beneficial use of warm and cold Freshwater Habitat (WARM and COLD) to not include fish and other metal or pH sensitive aquatic species, and remove the designated, but not existing, beneficial use of warm and cold water Spawning (SPWN) (as defined in the Basin Plan) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake.

One process to remove a designated beneficial use from a watercourse includes conducting a UAA, as described in the Federal Water Quality Standards (40 CFR 131.10g and 131.3g). A UAA is “an assessment of the factors affecting the attainment of aquatic life uses or other beneficial uses, which may include physical, chemical, biological, and economic factors.” When a designated state wishes to remove a designated use, the state shall conduct a UAA to justify the proposed change. In conjunction with this proposed Basin Plan Amendment, a UAA has been developed to support the proposed amendments.

This Staff Report evaluates the existing water quality in West Squaw Creek, evaluates if current beneficial use designations are appropriate, and proposes a Basin Plan amendment.

The purpose of the associated UAA for West Squaw Creek is to provide documentation and evidence to:

1. Show that, prior to 1975, discharges of metals and acidic water from historic mining operations in the West Squaw Creek watershed between the Early Bird tributary and Shasta Lake exceeded numeric water quality objectives currently identified to be protective of WARM, COLD, and SPWN uses.
2. Identify the causes of impairment.
3. Show that current levels of metal contamination in West Squaw Creek between the Early Bird tributary and Shasta Lake, although significantly less than the pre-1975 levels, continue to exceed the numeric water quality objectives identified to be protective of the current definition of WARM, COLD, and SPWN uses.
4. Show that the occurrence of metal sulfide deposits and historic mining activities in the West Squaw Creek watershed prevent the attainment of the numeric water quality objectives identified to be protective of the current definition of WARM, COLD, and SPWN.
5. Provide the information required by the RWQCB to prepare a Staff Report to amend the designated beneficial uses assigned to West Squaw Creek currently assigned using the tributary rule in the Basin Plan.

If this amendment is adopted by the RWQCB, MRRC will remain responsible for monitoring and maintaining the existing remedial facilities, complying with NPDES permits to protect remaining designated beneficial uses in West Squaw Creek and the uses of downstream water bodies, and implementing point and non-point source Best Management Practices (BMPs) as technology and methodologies become available.

General site location is shown in Figure 1-1. A site vicinity map, including watershed boundary and area features, is included in Figure 1-2.

Since 1978, MRRC has concentrated efforts on point and non-point source controls to attempt to attain water quality objectives in watercourse. Its efforts have resulted in the removal of over 92 percent of the total copper loading, and 68 percent of the zinc loading

²CWA Section 101 and 40 CFR Section 131 also requires the RWQCB to protect surface waters for fish and recreation, even if not designated. The State may dedesignate a use that is not “existing”. See 40 CFR Section 131.10. SWRCB Resolution 88-63 (Sources of Drinking Water Policy) requires the RWQCBs to protect waters of the state for municipal and domestic supply, unless exceptions apply.

reaching Shasta Lake. The impacted segment of West Squaw Creek, however, continues to exceed water quality objectives for pH, copper, zinc, and cadmium. As discussed further in this Staff Report, further reduction in loads of these metals that would result in achieving applicable water quality objectives to protect WARM, COLD, and SPWN (as currently defined in the Basin Plan) is not feasible and not necessary because those uses are not “existing” uses as that term is used in 40 CFR 131.3. MRRC is not in compliance with requirements of the NPDES permit with respect to water quality objectives that apply to WARM, COLD, and SPWN (as currently defined in the Basin Plan). Since those uses do not exist it is not necessary to continue to require compliance with the water quality objectives to protect those uses. The affect of a Basin Plan amendment removing those uses would be to have the RWQCB delete relevant requirements from the NPDES permits. This change would allow MRRC to focus its available resources on additional, more significant sources of ARD in other watersheds (Table 1-1) which will allow for greater overall reduction in metal loading to Lake Shasta and the Sacramento River.

TABLE 1-1
Current Average Metal Loading To Shasta Lake And Releases From Shasta Dam

Watershed	Average Metal Load (lbs/day)
Town Creek ¹	7.6
Horse Creek ¹	10.1
West Squaw Creek ¹	18.2
Little Backbone Creek ¹	69.6
TOTAL	105.5
Releases from Shasta Dam ²	91.7

¹Data obtained from monitoring reports submitted by Mining Remedial Recovery Company and Millennium Holdings, Inc, pursuant to their NPDES permits.

²Data obtained from U.S. Department of Interior, Bureau of Reclamation, Shasta Dam Unit.

1.1.4 Background on West Squaw Creek

Between 1896 and 1919, Shasta County developed into one of the major copper mining and smelting regions of the United States. Numerous mines supported five copper smelters. Shasta County led California in total value of mineral production, excluding petroleum, during this period. Predominately, the mineral extracted was copper. Approximately 620,000,000 pounds of copper was produced. The copper industry created the economic stimulus that resulted in the development of Shasta County as a commercial center. The West Shasta Copper Mining District of Shasta County accounted for the major amount of copper production in California prior to 1946. The copper resources of Shasta County are located along a horseshoe-shaped deposit (Figure 1-3) approximately 30 miles in length and one-half mile to four miles wide that stretches from Whiskeytown Lake to the west to Highway 299 to

the east. Historic geologic literature refers to this area as the "Copper Crescent." Mines in the area were developed extensively during the period from 1896 to 1919. Over a three-year period between 1919 and 1922, the smelters were shut down due to economics and pressure from farm interests related to fume damages to orchard crops. Due to the elimination of the smelters, the mines also ceased operation during this period. The mines have not operated appreciably since.

The majority of the mines within the West Shasta Copper Mining District had ceased operation by the early 1920s. Most of the mines were closed by a simple layoff of workers; salvaging what could be returned from the equipment, and abandoning the mine to nature. In some instances, the extensive underground workings of the mines were intentionally collapsed. The potential environmental impact of the exposure of the remaining sulfide ore bodies to oxygen and water was unknown. The portals, adits, and air vents introduce oxygen to the rocks, which, in the presence of water and sulfide minerals, results in the creation of sulfuric acid. The acidic water leaches residual metals from the ore, exiting the mines through existing seeps or portals.

Early prospectors used naturally occurring ARD as an exploration tool to locate mineralized deposits; however, this naturally occurring ARD was not well documented in the West Shasta Copper Mining District. The impact of ARD on the creeks of the West Shasta Copper Mining District was first documented in 1939. At that time, the seasonal flooding of the creeks and Sacramento River allowed for dilution of acidic waters. Following construction and filling of Shasta Dam, completed in 1945, fish kills were documented from ARD in the vicinity of the West Shasta Copper Mining District. These included fish in the West Squaw Creek arm of the lake immediately adjacent to the mouth of West Squaw Creek. Since 1939, attention has been directed at reducing ARD impacts in Shasta Lake and in the Sacramento River below Shasta Dam.

Studies by Hansen and Weidlein, scientists from the California Department of Fish and Game (DFG), documented the fish toxicity found in West Squaw Creek and portions of the West Squaw Creek of Shasta Lake and describe the metals concentrations and fish kills observed in the report titled *Investigation of mine drainage related to fish kills in the Little Squaw Creek Arm of Shasta Lake, Shasta County, California*, (1974). Additional information on the lack of fish life in West Squaw Creek due to metal concentrations can be found in the document titled *Fall 1999 biological assessment of Little Backbone Creek and West Squaw Creek, Shasta County California: Analysis of periphyton, benthic macroinvertebrates and fish communities* (2001).

Prior to the initiation of remedial activities in the watershed, discharge from point sources accounted for more than 90 percent of the metal loading in West Squaw Creek. Currently, discharge from the point sources account for less than 8 percent of the metal loading in the watershed. The remaining metal loading is attributed to non-point sources, including naturally occurring sources.

Since remedial activities were initiated in 1978 to address sources of ARD in West Squaw Creek, point source discharges of ARD have been reduced 95 percent from 560 pounds per day (lb/day) to 30 lb/day. Overall, point and non-point discharge has been reduced 80 percent from 720 lb/day to 150 lb/day. Even with these reductions, the discharges continue to be in violation of the water quality objectives identified in the Basin Plan to be protective of WARM, COLD, and SPWN (as currently defined in the Basin Plan). These objectives are also exceeded in portions of West Squaw Creek not directly impacted by past mining activities (Water Quality Appendix of UAA, “Background Concentrations”).

The RWQCB issued NPDES permits for the mines of the West Squaw Creek drainage in 1991. Since that time, the RWQCB has issued numerous Cease and Desist Orders for violations of effluent limits. Due to inability to meet promulgated limits, mine owners were served with citizen suits under provisions of the CWA in June 1996.

In 1998, due to the failure of applicable technology to achieve water quality objectives, the RWQCB requested MRRC to perform a UAA, as provided in the Federal Water Quality Standards (40 CFR 131) allowed by the CWA, to evaluate the appropriateness of current designated beneficial uses for West Squaw Creek. Compliance with water quality objectives protective of WARM, COLD, and SPWN (as currently defined in the Basin Plan) may be impossible with today’s technology.

1.2 Overall Regulatory Authority

This section discusses the control of surface water discharges under the CWA. It includes a discussion of the jurisdictional elements under the CWA, effluent limitations adopted under the CWA, the State’s implementation of this program, the further controls required to meet receiving water quality objectives, and the process to modify criteria.

1.2.1 Clean Water Act

The CWA regulates, among other matters, the discharge of pollutants from point sources into navigable waters of the United States. The discharge of metal-bearing acid rock drainage from mine sites into West Squaw Creek, and hence, into the Sacramento River, is the discharge of pollutants from a point source or sources into navigable waters of the United States. CWA controls are imposed on industries through NPDES permits, which are permitted on a case-by-case basis.

In establishing discharge limits, the permitting agency requires, at a minimum, that the discharger comply with the effluent limitations established under the CWA for the specific industrial category of the discharger. In the event there are no specific effluent limitations for the type of discharge at issue, the statute provides that the permit shall contain “such conditions as the Administrator determines are necessary to carry out the provisions of this chapter,” CWA §402(a)(1)(B), 33 U.S.C. §1342(a)(1)(B). USEPA uses “best professional judgment” (BPJ) to establish the effluent limitations if there is no regulation for the specific discharge category.

The CWA's system of technology-based effluent controls establishes effluent limitations according to whether the discharge is from a new or existing source and whether the pollutant is conventional/toxic, or a non-conventional/non-toxic pollutant. Existing sources of toxic discharges, such as ARD, were initially required to achieve Best Practicable Control (currently available) Technology (BPT) and then later to achieve Best Available (economically achievable) Technology (BAT).

1.2.2 Best Professional Judgment

In the absence of promulgated standards for effluent limitations, USEPA establishes effluent limitations by using its Best Professional Judgment (BPJ). Since there are no promulgated standards for discharges from inactive mines, effluent limitations using BPJ can be established.

There are no developed technology-based effluent limitations for inactive, historic copper or pyrite mines. There are technology-based limitations for active coal, iron, copper, and zinc mines. The effluent limitations for these other mining activities have historically been applied to a host of abandoned mines, including mines such as those on MRRC's properties. The RWQCB has used BPJ to establish an effluent limit of 99 percent reduction in metal loading from the mine portals.

1.2.3 Industry-Specific Effluent Limitations

Although there are no regulations that directly address effluent limitations from inactive historic copper mines such as those associated with West Squaw Creek, there are a number of industry categories analogous to the West Squaw Creek discharges which have been used by the various regulatory agencies to set discharge controls in the past. Among these are effluent limitations that have been established for active coal mines, iron mines, and other metal mines.

40 CFR Part 434 includes effluent limitations for coal mining point sources, including special provisions in Subpart C on "Acid of Ferruginous Mine Drainage." Part 440 of 40 CFR also contains the effluent limitations for ore mining. It includes specific sections on iron ore (Subpart A), and metals including copper and zinc (Subpart J). 40 CFR §434.10 "applies to discharges from any coal mine at which the extraction of coal is taking place or is planned to be undertaken"; 440.10 "are applicable to discharges from (a) mines operated to obtain iron ore...; (b) mills beneficiating iron ores..."; and 440.100 "applicable to discharges from...mines that produce copper, zinc, ..."

These regulations specifically apply to active, not inactive, mining areas but have historically been applied in NPDES permits for various types of inactive mines. These standards were replaced with a narrative discharge standard in MRRC's recent permits. BPT and BAT limits on discharges from existing point sources at active copper and zinc mines are established under 40 CFR §440.102(a) and 440.103(a).

1.2.4 Best Available Technology/Best Management Practices

As outlined in the CWA, existing sources of discharges (point sources) were initially required to achieve BPT and then later achieve BAT. Non-point sources (such as waste rock piles) are remedied using BMPs. BAT and BMP are more commonly used interchangeably.

Best Available Technology represents the maximum feasible pollution reduction for point sources, using the most stringent technology available for controlling discharge. BAT treatment requirements take into consideration that they are “economically achievable.” Major sources are required to use BAT, unless it can be demonstrated that it is not feasible due to ineffective uses of energy, or for environmental or economic reasons. In general, BAT for mine point source remedies include portal plugging, surface water diversion; and for treatment, lime neutralization.

The Non-point Source Program, Strategy, and Implementation Plan, originally adopted by the SWRCB in 1988 (SWRCB, 2003), describes three general management approaches to be used to address non-point source problems. These are:

1. Voluntary implementation of best management practices
2. Regulatory-based encouragement of best management practices
3. Adopted effluent limits.

In general, the least stringent option that successfully protects or restores water quality is employed. Guidance with specific BMPs for mining non-point sources were identified in Board Resolution 79-149, and usually consist of capping waste materials in place or relocating, storing, and capping them in a more suitable location. These are included in Figure 1-4. More recently, BAT and BMPs are grouped together under BMPs.

1.2.5 California Basin Plans

The preparation and adoption of a Basin Plan is required by the California Water Code (Section 13240) and supported by the CWA.

Section 303 of the CWA, 33 U.S.C. §1313, provides for promulgation of water quality standards by the states. The standards consist of designated uses of water and water quality criteria based on the designated uses (40 CFR §131.3(i)). The criteria are “elements of State water quality standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use” 40 CFR §131.3(b). The RWQCB has adopted these water quality standards in the Basin Plan as water quality objectives.

According to CWC Section 13050, Basin Plans consist of a designation or establishment for the waters within a specified area of beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives.

Since beneficial uses, together with their corresponding water quality objectives constitute water quality standards as used in the federal regulations, the Basin Plans are regulatory standards for meeting state and federal requirements for water quality control (40 CFR 131.20).

1.2.6 Beneficial Uses/Water Quality Objectives

CWA section 101(a)(2) establishes an interim goal that, “wherever attainable . . . water quality which provides for the protection and propagation of fish, shellfish, and wildlife and provides recreation in and on the water be achieved.” States have the primary authority for defining and designating the uses to be protected in their waters. USEPA’s water quality standards regulation (40 CFR 131) requires states to “take into consideration the use and value of water” for various uses, including protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, and prohibits the removal, sub-categorization, or failure to designate these CWA goal uses unless their attainment is infeasible due to one or more of six use attainability factors.

Uses may be designated as either existing or potential uses. An existing use is any use that has existed in the stream at any time since November 28, 1975 (40 CFR 131.3). Existing uses must be fully protected and cannot be removed (40 CFR 131.10(h)(1)). A potential use is a use that has not existed in the water body since November 28, 1975. A potential use may only be removed or modified through a formal UAA. To develop water quality standards, states first identify all attainable uses of a water body. States then adopt water quality objectives standards for individual designated uses.

Water Quality objectives are set in the Basin Plans based on beneficial uses. The Porter-Cologne Water Quality Control Act defines water quality objectives as “... the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area” (Water Code Section 13050(h)). In establishing water quality objectives, the RWQCB considers, among other things, the following factors:

- Past, present, and probable future beneficial uses
- Environmental characteristics of the hydrographic unit under consideration, including the quality of water available
- Water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area
- Economic considerations
- The need for developing housing within the region
- The need to develop and use recycled water

States establish water quality objectives for a wide range of substances sufficient to protect the designated uses. Discharger effluent limits are based upon the water quality criteria. Criteria are usually expressed as maximum concentrations of individual substances that may be present in a water body without causing impairment of designated uses. The Basin Plan includes both numeric and narrative water quality objectives. The numeric objectives for the Sacramento River and its tributaries above State Highway 32 Bridge, an area that includes West Squaw Creek and the relevant tributaries, are summarized below:

- Cadmium 0.22 µg/l
- Copper 5.6 µg/l
- Zinc 16.0 µg/l
- pH 6.5 - 8.5 (changes shall not exceed 0.5 units)

The numeric water quality objectives for cadmium, copper, and zinc were established in 1985, and were intended to “fully protect the fishery from acute toxicity since the standards are based on short-term bioassays on the critical life stages of a sensitive species”; in this case anadromous salmonids. These numeric values vary logarithmically with hardness; however, the actual values stated are those listed in the Basin Plan and are based on a hardness of 40 µg/l.

The Basin Plan makes several relevant comments regarding water quality objectives. For example, they do not need to be met at the point of discharge, but at the edge of the mixing zone if areas of dilution are defined and should be attained and measured in the main water mass. Achievement of water quality objectives depend on applying them to “controllable water quality factors,” which are defined as “those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, which are subject to the authority of the SWRCB or the RWQCB, and that may be reasonably controlled.”

Under CWA §304(1), added by the 1987 amendments to the CWA, USEPA and the states were required to identify water bodies that are not achieving water quality standards due to toxic releases and to develop a control strategy for the sources. This program is in many respects a more focused effort akin to the water quality standards effort discussed above. West Squaw Creek, a tributary of the Sacramento River, is listed as impaired water pursuant to Section 303(d).

1.2.7 California Toxic Rule

Federal regulations contained in 40 CFR 122.4(d) require effluent limitations for all pollutants that are, or may be, discharged at a level that will cause, or have the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numerical water quality standard. USEPA adopted the National Toxics Rule (NTR) on February 5, 1993, and the California Toxics Rule (CTR) on May 18, 2000. The NTR and CTR contain water quality standards applicable to this drainage. The SWRCB adopted the Policy for

Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (State Implementation Plan), which contain guidance on implementation for the NTR and CTR. Federal regulations contained in 40 CFR 122.44(d) require effluent limitations for all pollutants that are or may be discharged at a level that will cause or have the reasonable potential to cause or contribute to an in-stream excursion above a narrative or numerical water quality standard.

1.2.8 Modifications of Water Quality Standards

Although the goal of the CWA is to ensure that all waters are “fishable and swimmable”, the Act and its regulations do offer some flexibility to states to modify designated uses, water quality criteria, and the associated effluent limits to reflect local needs and conditions. These methods for modifying water quality standards and water quality-based permit limits in effluent-dependent streams are:

1. Total Maximum Daily Load (TMDL) Analysis
2. Alternate water quality criteria, such as site-specific criteria
3. Use Attainability Analysis to modify beneficial uses

A UAA may be used only if, (1) the existing uses in the stream will be protected and, (2) all controls required by Sections 301(b) and 306, as well as reasonable and effective best management practices for non-point sources have been implemented for the stream segment. The UAA process described in the federal regulations allows states to assess the feasibility of attaining the goal of fishable-swimmable uses in particular water bodies. The UAA can demonstrate that certain uses should be modified to reflect those that are actually attainable.

The UAA process provides six factors to assist in making this demonstration. Before conducting a UAA, states must demonstrate that the use under consideration is not an existing use. An existing use is one that has been attained in the water any time since November 28, 1975. 40 CFR 131.10(g) specifies the conditions under which a designated use may be removed from a stream:

States may remove a designated use which is not an existing use, as defined in 131.3, or establish sub-categories of a use if the state can demonstrate that attaining the designated use is not feasible because:

1. Naturally occurring pollutant concentrations prevent the attainment of the use
2. Natural, ephemeral, intermittent, or low-flow conditions prevent the attainment of the use, unless these conditions may be compensated for by discharge of sufficient volume of effluent discharges without violating state water conservation requirements to enable uses to be met

3. Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place
4. Dams, diversions, or other types of hydrological modifications preclude the attainment of the use, and it is not feasible to restore the water body to its original condition or to operate the modification in a way that would result in attainment of the use
5. Physical conditions related to the natural features of the water body such as the lack of proper substrate, cover, flow, depth pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses
6. Controls more stringent than those required by sections 301(b) of the Act would result in substantial and widespread economic and social impact

The level of complexity and required documentation for UAAs will depend upon the situation. For example, when attempting to establish appropriate aquatic life uses, it will be relatively simple to demonstrate that certain aquatic life forms will be unable to exist in an area because of physical factors; i.e., no level of water quality will induce fish to spawn in areas where the bottom strata are not what the particular species requires for spawning.

The UAA which supports the proposed amendments is based on criteria (3):

“Human caused conditions or sources of pollution prevent the attainment of the use and cannot be remedied or would cause more environmental damage to correct than to leave in place.”

1.3 PURPOSE AND INTENDED USE OF THIS STAFF REPORT

The purpose of this Staff Report is to define and provide support for the proposed Basin Plan amendments, presented herein, and to provide the rationale behind each part of each amendment. Section 1 (Introduction) provides historical and regulatory background for the Basin Plan amendment process, defines the purpose and need for the proposed site-specific amendments, and provides a brief background on West Squaw Creek. Section 2 (Summary of Proposed Amendments to the Basin Plan) presents the modifications to current designated, but not existing beneficial uses assigned to West Squaw Creek that constitute the proposed amendments, and a brief discussion on the intent of each amendment. Section 3 (Beneficial Uses) discusses West Squaw Creek’s beneficial uses. Section 4 (Water Quality Objectives) discusses the rationale for the proposed amendments. Section 5 (Consistency With Federal And State Laws And Policies) evaluates the proposed amendments with respect to the federal and state water quality policies and the Endangered Species Act. Section 6 (Monitoring And Surveillance Program) discusses the current and planned monitoring to assure no backsliding

of current water quality occurs and the mine owners remain in compliance with their NPDES permit. Finally, Section 7 includes the analysis of environmental impacts associated with the proposed.

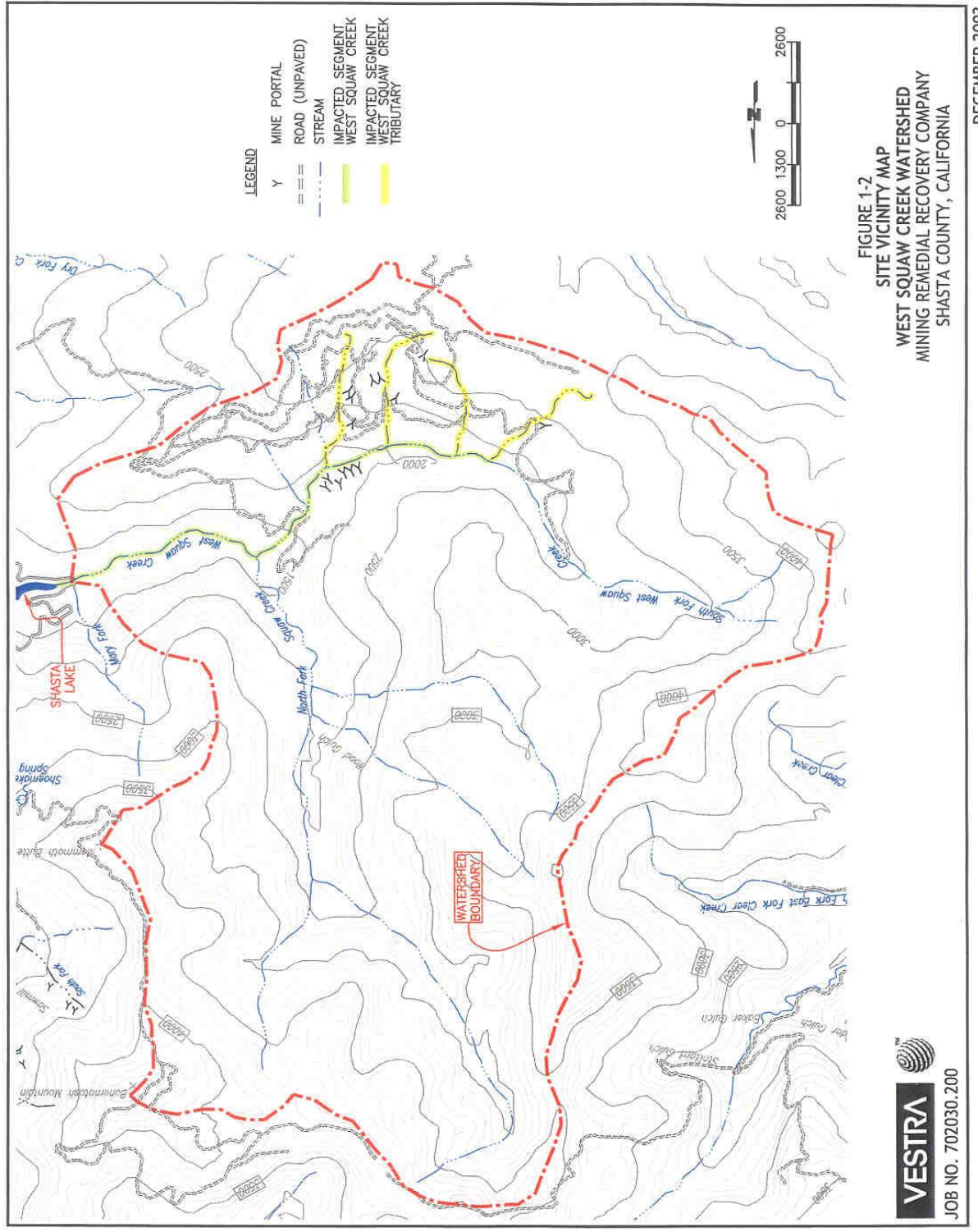
This report will be circulated for comment and the proposed Basin Plan amendments will be the subject of a public hearing before the Regional Board. After the public hearing is closed, the Regional Board may adopt the amendments as proposed, make modifications to the proposed amendments (major modifications would require a new public hearing) and adopt, or not adopt the proposed amendments. The public hearing will be noticed according to standard Regional Board protocols. Interested parties are encouraged to comment on the proposed Basin Plan amendments and Staff Report. RWQCB staff will provide written responses to comments received. To assist staff in identifying and responding to comments, please submit written comments in the format suggested in Appendix A. Any questions concerning the proposed amendments should be directed to Mr. Philip Woodward at (530) 224-4853.

Following adoption by the RWQCB, the proposed Basin Plan amendments will not become effective until reviewed and approved by the SWRCB, OAL, and USEPA. The entire review and approval process (from the time RWQCB staff present the proposed amendments to their Board until approved by USEPA) is estimated to be completed by October/November 2004.

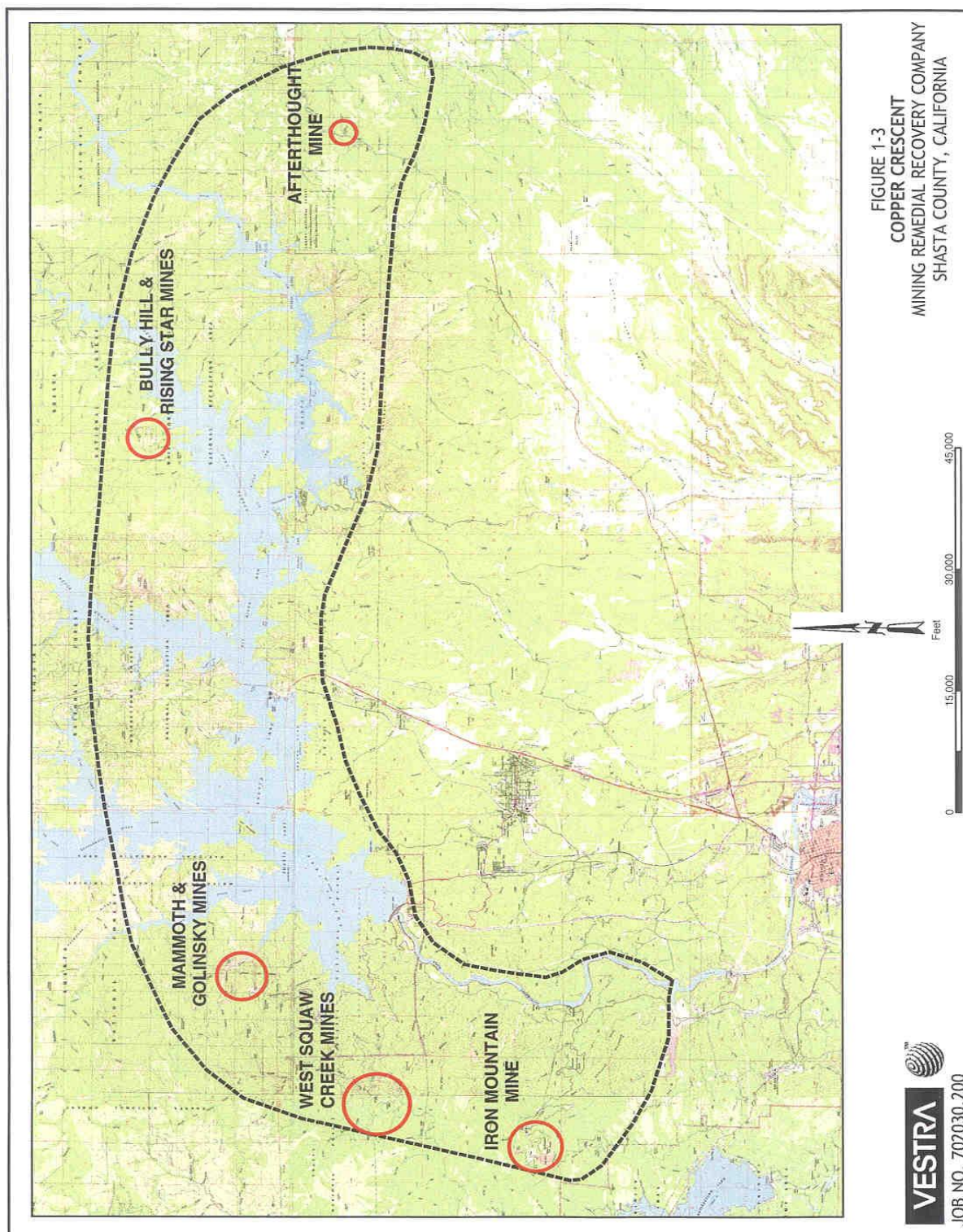


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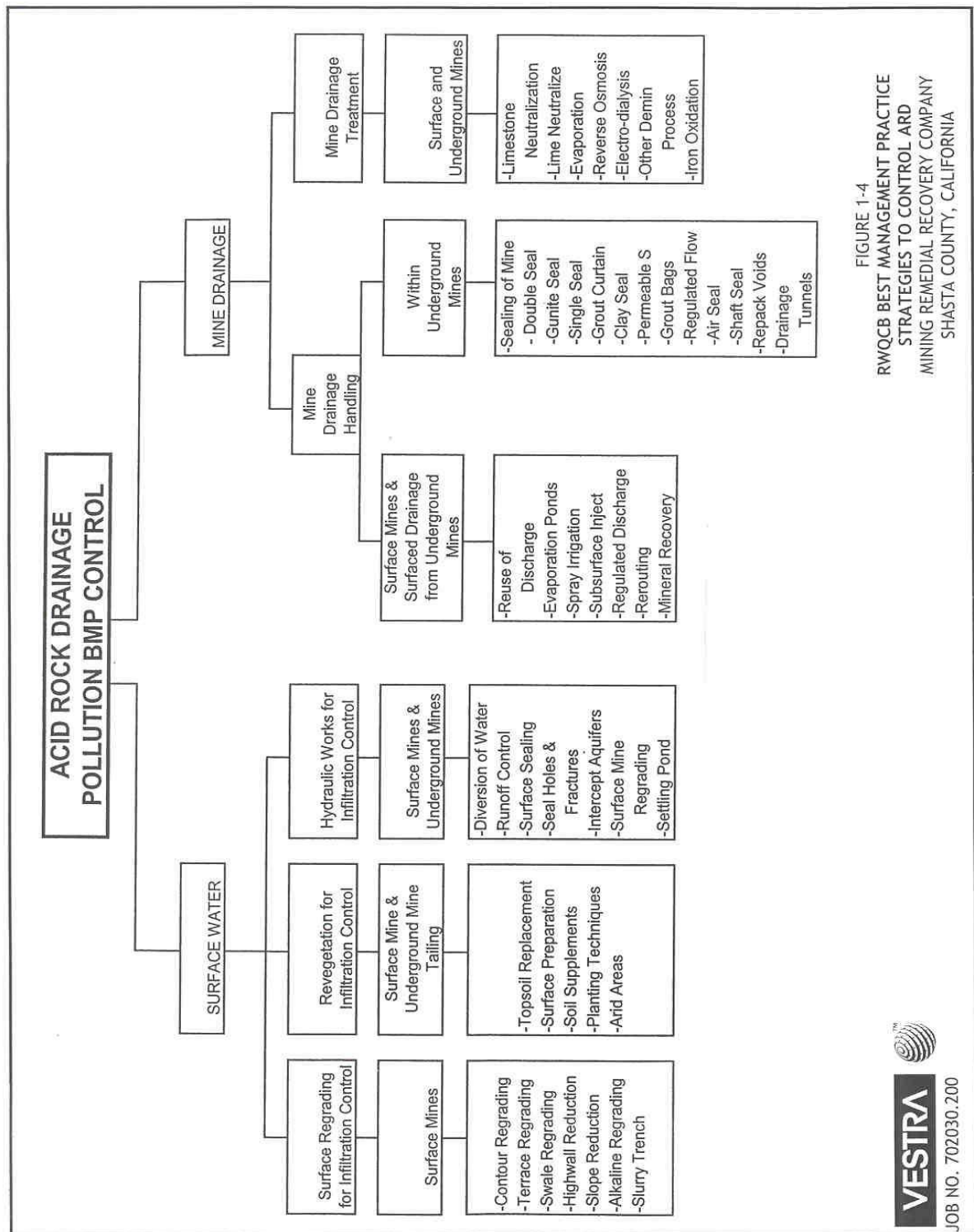


FIGURE 1-4
RWQCB BEST MANAGEMENT PRACTICE
STRATEGIES TO CONTROL ARD
MINING REMEDIAL RECOVERY COMPANY
SHASTA COUNTY, CALIFORNIA

2.0 SUMMARY OF PROPOSED AMENDMENTS TO THE BASIN PLAN

This section of the Staff Report presents the amendment language as it is proposed to appear in the Basin Plan, and provides brief statements defining the intent of the new language added to the Basin Plan via these amendments. Specifically, the amendments proposed in this Staff Report consist of removing designated, but not existing beneficial uses of cold and warm Freshwater Habitat (COLD and WARM), and warm and cold water Spawning (SPWN) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake and specifically identifying the remaining existing or potential uses.

2.1 Introduction (Basin Plan Chapter 1)

No modifications to Chapter I (Introduction) of the Basin Plan are proposed.

2.2 Existing and Potential Beneficial Uses (Basin Plan Chapter II)

The action proposed in this Staff Report is to modify the beneficial uses of WARM, COLD) to not include fish and other metal or pH sensitive aquatic species, and remove the designated, but not existing, beneficial use of SPWN (as defined in the Basin Plan) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake.

The specific proposed additions to the Basin Plan will be to specifically identify the beneficial uses of the identified segment of West Squaw Creek in Table II-1, Surface Water Bodies And Beneficial Uses, Section II. The additions are highlighted and italicized (*highlighted*).

2.3 Water Quality Objectives (Basin Plan Chapter III)

The action proposed in this Staff Report is to modify the geographic extent of specific Water Quality Objectives to exclude West Squaw Creek from the Early Bird Tributary to Shasta Lake.

The specific proposed additions to the Basin Plan are to Table III-1, *Trace Element Water Quality Objectives*, and include modifications to the applicability of the trace metals Cadmium, Copper, and Zinc. The additions are highlighted and italicized (*highlighted*).

2.4 Implementation (Basin Plan Chapter IV)

No modifications to Chapter IV (Implementation) of the Basin Plan are proposed.

2.5 Surveillance and Monitoring (Basin Plan Chapter V)

No modifications to Chapter V (Surveillance and Monitoring) of the Basin Plan are proposed.

NOTE THAT ONLY THAT PORTION OF THE BASIN PLAN WITH CHANGES IS PROVIDED.

SURFACE WATER BODIES AND BENEFICIAL USES

	Surface Water Bodies (1)	Hydro Unit Number	MUN	Agri-culture			Industry			Recreation			Freshwater Habitat(2)		Migration		WILD	NAV
				Irrigation	Stock	Watering	PROC	IND	POW	REC-1	Canoeing (1) and Rafting	Other	WARM	COLD	Warm (3)	Cold (4)		
1	McCloud River	505.	E	E	E				E	P	E	E	E	E			E	
2	Goose Lake	527.20											E	E			E	
3	Pit River		E	E	E					P	E	E	E	E			E	
4	North Fork, South Fork, Pit River	526.00											E	E			E	
5	Confluence of Forks to Hat Creek	526.35	E	E	E				E	E	E	E	E	E			E	
6	Fall River	526.41	E	E	E				E	E	E	E	E	E			E	
7	Hat Creek	526.30		E	E				E	E	E	E	E	E			E	
8	Baum Lake	526.34							E	E	E	E	E	E			E	
9	Mouth Of Hat Creek To Shasta Lake	526.	E	E	E				E	E	E	E	P	E			E	
10	Sacramento River	525.22		E	E								E	E			E	
11	Source To Box Canyon Reservoir	525.22											E	E			E	
12	Lake Siskiyou	525.22											E	E			E	
13	Box Canyon Dam to Shasta Lake	525.2	E	E	E				E	E	E	E	E	E			E	
14	Shasta Lake	506.10	E	E	E				E	E	E	E	E	E			E	
15	West Squaw Creek		E	E	E				E	E	E	E	E	E			E	
16	Shasta Dam To Colusa Basin Drain	524.61	E	E	E				E	E	E	E	E	E			E	
17	Whiskey Town Reservoir	524.62	E	E	E				E	E	E	E	E	E			E	
18	Clear Creek Below Whiskeytown	507.3	P	E	E				E	E	E	E	E	E			E	
19	Cow Creek	507.12		E	E				E	E	E	E	E	E			E	
20	Battle Creek	524.3	E	E	E		P		E	E	E	E	E	E			E	
21	Cottonwood Creek	509.63	E	E	E				E	E	E	E	E	E			E	
22	Antelope Creek	509.42	E	E	E				E	E	E	E	E	E			E	
23	Mill Creek	523.10	E	E	E				E	E	E	E	E	E			E	
24	Thomes Creek	509.20	E	E	E				E	E	E	E	E	E			E	
25	Deer Creek	509.14		E	E				E	E	E	E	E	E			E	
26	Big Chico Creek	522.00		E	E				E	E	E	E	E	E			E	
27	Stony Creek	522.33		E	E				E	E	E	E	E	E			E	
28	East Park Reservoir	522.12		E	E				E	E	E	E	E	E			E	
29	Black Butte Reservoir			E	E				E	E	E	E	E	E			E	
30	Butte Creek																	
31	Sources to Chico	521.30	E	E	E				E	E	E	E	E	E			E	
32	Below Chico, Including Butte	520.40		E	E				E	E	E	E	E	E			E	
33	Colusa Basin Drain	520.21		E	E				E	E	E	E	E	E			E	

Legend:
 E = Existing Beneficial Uses
 P = Potential Beneficial Uses
 L = Existing Limited Beneficial Use
 a = Cold And Warm Freshwater Habitat does not include fish and other metal or pH sensitive aquatic species in West Squaw Creek from Early Bird Tributary to Shasta Lake

Note:
 Surface waters with the beneficial uses of Groundwater Recharge (GWR), Freshwater Replenishment (FRSH), and Preservation of Rare and Endangered Species (RARE) have not been identified in this plan. Surface waters of the Sacramento and San Joaquin River Basins falling within these beneficial use categories will be identified in the future as part of the continuous planning process to be conducted by the State Water Resources Control Board.

Bacteria

In waters designated for contact recreation (REC- I), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.

For Folsom Lake (50), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 100/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 200/100 ml.

Biostimulatory Substances

Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

Chemical Constituents

Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The chemical constituent objectives in Table III-1 apply to the water bodies specified. Metal objectives in the table are dissolved concentrations. Selenium,

molybdenum, and boron objectives are total concentrations. Water quality objectives are also contained in the Water Quality Control Plan for Salinity, adopted by the State Water Board in May 1991.

At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 6443 I-A (Inorganic Chemicals) and 6443 I-B (Fluoride) of Section 6443 1, -, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. The Regional Water Board acknowledges that specific treatment requirements are imposed by state and federal drinking water regulations on the consumption of surface waters under specific circumstances. To protect all beneficial uses the Regional Water Board may apply limits more stringent than MCLs.

TABLE III- I
TRACE ELEMENT WATER QUALITY OBJECTIVES

<u>CONSTITUENT</u>	<u>MAXIMUM CONCENTRATION</u> ^a (mg/l)	<u>APPLICABLE WATER BODIES</u>
Arsenic	0.01	Sacramento River from Keswick Dam to the I Street Bridge at City of Sacramento (13, 30); American River from Folsom Dam to the Sacramento River (51); Folsom Lake (50); and the Sacramento-San Joaquin Delta.
Barium	0.1	As noted above for Arsenic.
Boron	2.0 (15 March through 15 September) 0.8 (monthly mean, 15 March through 15 September) 2.6 (16 September through 14 March), 1.0 (monthly mean, 16 September through 14 March) 1.3 (monthly mean, critical year ^b)	San Joaquin River, mouth of the Merced River to Vernalis
Cadmium	0.00022 ^c	Sacramento River and its tributaries above State Hwy 32 bridge at Hamilton City, <u>except for West Squaw Creek from the Early Bird Tributary to Shasta Lake.</u>

3.0 BENEFICIAL USE DESIGNATIONS

This section of the Report provides a brief overview of federal and state regulations pertaining to beneficial use designation as part of establishing water quality standards. This section also discusses West Squaw Creek's past, present, and probable future beneficial uses, and the proposed Basin Plan amendments for the removal of designated, but not existing beneficial uses

3.1 Federal and State Regulatory Overview

CWA Section 303 requires that states protect beneficial uses of waters of the United States within their jurisdictional boundaries. USEPA regulations interpret this to further require that states adopt water quality criteria that protect the designated "beneficial uses" of water bodies (referred to as "objectives" in California). The designated beneficial uses, the water quality criteria to protect those uses, and an antidegradation policy constitute water quality standards.

A water quality standard defines the water quality goals for a water body that protects the designated beneficial use or uses. States adopt water quality standards to protect public health or welfare, enhance the quality of water, and serve the purposes of the CWA. "Serve the purposes of the Act" (as defined in CWA Sections 101(a)(2) and 303(c)) means that water quality standards should, at a minimum:

- provide, wherever attainable, water quality for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water
- consider the use and value of state waters for public water supplies, propagation of fish and wildlife, recreation, agriculture, industrial purposes, and navigation.

The CWA requires states to protect "existing uses." Existing uses are defined as those beneficial uses actually attained in the water body on or after November 28, 1975 (40 CFR 131.3(e)).

In designating beneficial uses the RWQCB must consider the following, among other things: the past, present, and probable future beneficial uses of water; environmental characteristics of the hydrographic unit under consideration, including the quality of water thereto; economics; and the water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area (Water Code Section 13241).

In compliance with the CWA, CWC Section 13240 requires the RWQCBs to designate and establish, for specific basins, beneficial uses to be protected, water quality objectives to protect those uses, and a program of implementation needed for achieving the objectives. These Basin Plans meet the federal mandate and are the regulatory standards for meeting the state and federal requirements for water quality control (40 CFR 131.20).

The CWC identifies the beneficial uses of waters to include “domestic, municipal, agricultural and industrial supply, power generation, recreation, aesthetic enjoyment, navigation, preservation, and enhancement of fish, wildlife, and other aquatic resources or preserves” (CWC Section 13050(f)). Protection and enhancement of existing and potential beneficial uses are primary goals of water quality planning. The Basin Plans include those and other uses and list the uses as either existing, potential, or limited.

3.2 Beneficial Uses of West Squaw Creek

3.2.1 Designated Beneficial Uses

The beneficial uses for specific surface water bodies are identified in the Basin Plan. Although the Basin Plan only lists beneficial uses for large water bodies such as Shasta Lake, beneficial uses for smaller water bodies are generally assigned the same beneficial uses as the nearest listed downstream water body. The Basin Plan states that, “The beneficial uses of any specifically identified water body generally apply to its tributary streams...”

West Squaw Creek is a tributary to Shasta Lake, a “named” water body in the Basin Plan. In the issuance of waste discharge requirements to regulate discharge of ARD from the abandoned copper mines along West Squaw Creek, the RWQCB has historically assigned the lake’s beneficial uses to West Squaw Creek, whether or not the use is existing, or potential (Waste Discharge Requirements Order No. R5-2002-0153). consistent with federal and state law. Beneficial uses and descriptions, identified by the RWQCB for West Squaw Creek, are included in Table 3-1.³

Table 3-1 IDENTIFIED BENEFICIAL USES FOR SHASTA LAKE	
Beneficial Use	<i>Description</i>
Municipal and Domestic Supply (MUN)	Uses of water for community, military, or individual water supply systems include, but are not limited to, drinking water supply.
Agricultural Supply (AGR)	Uses of water for farming, horticulture, or ranching include, but are not limited to, irrigation (including leaching of salts), stock watering, or support of vegetation for range grazing.
Hydropower Generation (POW)	Uses of water for hydropower generation.

³Migration is not a designated beneficial use of Shasta Lake due to the construction of Shasta Dam and is, therefore, not listed as a designated use for West Squaw Creek. It has not been an existing use since 1942, when the dam was constructed.

Table 3-1 (continued) IDENTIFIED BENEFICIAL USES FOR SHASTA LAKE	
Beneficial Use	Description
Water Contact Recreation (REC-1)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs.
Non-contact Water Recreation (REC-2)	Uses of water for recreational activities involving proximity to water, but where there is generally no body contact with water, nor any likelihood of ingestion of water. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tide pool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems include, but are not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Cold Freshwater Habitat (COLD)	Uses of water that support cold water ecosystems include, but are not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Spawning, Reproduction, and/or Early Development (SPWN)	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish. (Fish, as defined in the Basin Plan, includes only striped bass, sturgeon, shad, salmon, and steelhead)
Wildlife Habitat (WILD)	Uses of water that support terrestrial or wetland ecosystems include, but are not limited to, preservation and enhancement of terrestrial habitats or wetlands, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.

3.3 Alternatives Considered

Three alternatives were considered for developing appropriate beneficial uses for West Squaw Creek: (1) no action; (2) adopting interim beneficial uses until remedial activities can be implemented to achieve all current designated beneficial uses, and (3) adoption of existing site-specific beneficial uses for West Squaw Creek. The criteria used for selecting the recommended alternative included:

- 1) consistency with State and federal water quality laws and policies;
- 2) protection of current, existing beneficial uses;
- 3) consistency with the current science regarding water quality necessary to reasonably protect the existing beneficial uses; and
- 4) applicability to West Squaw Creek, an ARD affected waterbody.

3.3.1 Alternative 1 – No Action

Under this alternative, the current Basin Plan designated, but not existing, beneficial uses for WARM, COLD (including fish and other metal or pH sensitive aquatic species), and the designated, but not existing use for SPWN would remain unchanged and would continue to apply to West Squaw Creek. The Water Quality Objectives for the Upper Sacramento River for Cadmium, Copper and Zinc would continue to apply to West Squaw Creek.

3.3.2 Alternative 2 – Adopt Interim Beneficial Uses

Under this alternative, the beneficial use for WARM, COLD would be modified to exclude fish and other metal or pH sensitive aquatic species, and the designated, but not existing use for SPWN would be removed and the geographical applicability of the Trace Element Water Quality Objectives for Cadmium, Copper, and Zinc for the Upper Sacramento River would be limited for a specific period of time until remedial activities could be implemented to improve water quality to the point where the designated beneficial uses could be obtained. This would require all sources of acid rock drainage, both man caused and natural sources, to be reduced to the point where the concentrations of cadmium, copper, and zinc in West Squaw Creek meet the Basin Plan Objectives for receiving waters, a goal that is not achievable with current technology.

3.3.3 Alternative 3 – Adopt Permanent Changes to Beneficial Uses

Under this alternative, the beneficial use for WARM, COLD would be modified to exclude fish and other metal or pH sensitive aquatic species, and the designated, but not existing use for SPWN would be permanently removed. The geographic applicability of the Trace Element Water Quality Objectives for Cadmium, Copper, and Zinc would not apply to West Squaw Creek from the Early Bird Tributary to Shasta Lake.

3.4 Recommended Alternative

Alternative 3 is the recommended alternative since the action would:

1. Be consistent with state and federal water quality laws and policies;
2. Is protective of current and post 1975 beneficial uses and improvements in water quality attained since 1975;

3. Recognize that the technology does not currently exist, nor is it likely to exist in the foreseeable future, to remove the impacts of ARD to the degree where the subject beneficial uses could exist,
4. Allow the RWQCB to reasonably address regulatory issues associated with abandoned mine site remediation and to focus remedial efforts on other, more significant sources of metal loading to Shasta Lake and the Sacramento River,
5. Allow responsible parties to focus their efforts on other, more significant point and non-point sources of ARD impacted waterbodies tributary to Shasta Lake where the efforts will result in more significant reductions in metal loading to Shasta Lake and the Sacramento River.

Adoption of Alternative 1 (No Action) would not result in demonstrable benefits to improve water quality and reduce metal loading to West Squaw Creek, and would be inconsistent with the current science regarding control of ARD. Moreover, it would not resolve the current regulatory issue associated with ARD impacted streams and would result in the expenditure of resources that could be more effective in reducing metal loading to Shasta lake and the Sacramento River if applied on other impacted tributaries to Shasta Lake. Alternative 2, implementation of interim beneficial uses would not be appropriate as there is no technology in the foreseeable future that will result in the reduction of ARD to allow West Squaw Creek to support the subject beneficial uses.

3.4.1 Basis for and Evaluation of Proposed Removal of Beneficial Uses

The CWA Amendments of 1987 allow for the identification of stream segments where the water quality does not meet and is not expected to meet the prescribed water quality standards for potential beneficial uses even with the application of technology-based effluent limitations as required under Section 301 and 306 of the Act. These stream segments are identified as “water quality limited segments.” West Squaw Creek was designated as a “limited segment” in 1989 due to limitations on aquatic habitat. It is important to note that these data reflect substantial remedial activities that have been conducted by MRRC including portal plugging and surface water diversions. Overall remedial activities have reduced the copper load at the West Squaw Creek Bridge by 92 percent from 305 lbs/day to less than 23 lbs/day, and the zinc load by 68 percent from 409 lbs/day to 131 lbs/day. Although significant gains have been made in raising the pH toward the levels established in the Basin Plan, the copper and zinc levels continue to exceed the Basin Plan standards (see Table 2-6 and Water Quality Appendix of the UAA.)

The beneficial uses associated with aquatic life are those most impacted by ARD and are discussed in detail below.

3.4.2 Impacted Designated Beneficial Uses

USEPA defines “existing uses” as those beneficial uses actually attained in the water body on or after November 28, 1975. Uses are considered attainable if they have actually been documented or if conditions conducive to supporting the use have occurred. No documentation of the beneficial uses or the physical, chemical, or biological characteristics of West Squaw Creek is available for any time prior to 1942. Limited data are available for West Squaw Creek prior to 1975. The West Squaw Creek Watershed has been significantly altered due to mining and other human activities. Hence, West Squaw Creek hydrology, beginning in the 1880s, was already largely impacted by human activities, and has continued to be impacted by such historic human activities in recent decades.

To define the existing water quality of West Squaw Creek, available data were reviewed to determine conditions in the area prior to and following the regulatory beneficial use date of November 28, 1975. Historical records from the California Department of Fish and Game (DFG) show that fish kills at the mouth of West Squaw Creek were common after construction of Shasta Dam. Certain species of fish trapped behind the dam sought out the colder water from West Squaw Creek and were killed by the metal concentrations in the Squaw Creek discharge.

Water quality data for West Squaw Creek collected prior to 1975 are summarized in Table 2-6 of the UAA. The limited pre-1975 data show that the pH was low, ranging from 2.82 to 6.3, and that the copper concentration significantly exceeded the limit established in the Basin Plan.

Based on these data, although significant improvement has been made, the beneficial uses for support of WARM, COLD, and SPWN specified in the Basin Plan are likely unattainable in West Squaw Creek, and were never attained in West Squaw Creek from at least 1941 to 1975.

Finding No. 18 of Waste Discharge Requirements Order No. R5-2002-0153 adopted by the RWQCB to regulate discharges from the abandoned copper mines along West Squaw Creek states:

- “18. There is no evidence that the designated beneficial use for support of a warm-water or cold-water fishery, or fish spawning in Little Backbone Creek, in the lower reaches of West Squaw Creek, or in Spring Creek were present below the sources of AMD prior to adoption of the Basin Plan.”

3.4.3 Current Conditions Of West Squaw Creek

3.4.3.1 Physical And Chemical

In the fall of 1999, DFG conducted biological assessments in seven reaches of West Squaw Creek. Physical, chemical, and biological conditions of the stream were evaluated (California

Department of Fish and Game, 2001). The objective of the work was to evaluate the attainable or potential beneficial uses of West Squaw Creek for the UAA. The information is summarized below:

A Physical Habitat Quality Assessment evaluates a stream's ability to support life apart from the effect of water quality. A majority of the sites sampled received excellent physical habitat scores. No sites received less than a good rating. Consistency in physical habitat scores allowed comparison of reference (background) reaches to other sites in the study area.

The chemical characteristics varied among reaches. In particular, pH levels ranged between 7.96 and 4.28. Lowest alkalinity and highest hardness levels were found in the more downstream sites of West Squaw Creek. Alkalinity and hardness ranged from 40 mg/l to <10 mg/l and 144 mg/l to 15 mg/l, respectively. Temperatures generally ranged from 18.7 C to 10.3 C, increasing in more downstream sites. Specific conductance ranged from 41 μ mhos/cm to 455 μ mhos/cm.

Results of heavy metal analysis at sites on West Squaw Creek revealed soluble cadmium, copper, and zinc concentrations that are toxic to most aquatic organisms. Elevated levels were also found in the background reach of upper Squaw Creek where no mining has taken place. Cadmium, copper, and zinc concentrations were measured up to 38.0 μ g/l, 2390 μ g/l, and 6,020 μ g/l, respectively in the affected area of West Squaw Creek. By comparison, the water quality objectives in the Basin Plan for cadmium, copper, and zinc are 0.22 μ g/l, 5.6 μ g/l, and 16 μ g/l, respectively. Soluble iron levels were only greater than 100 μ g/l at three sampling locations in West Squaw Creek, identified as WSC-4, WSC-5, and WSC-6 in the 2001 report. The concentrations of soluble nickel in water samples were never greater than 20 μ g/l.

3.4.3.2 Biological condition

Three communities of organisms, periphyton, benthic macro-invertebrates, and fish were collected to assess the biological conditions of the stream. Organisms from different trophic levels respond to pollution in different ways, and analysis of multiple trophic levels provides complete analysis.

Aquatic biological communities require a diversity of physical and chemical conditions to maintain high species diversity and species richness. In particular, high quality physical stream habitat must be present to support aquatic communities. The two reference streams in the surrounding area (DC-1 and SC-1) and the headwater sites exhibited a normal range of chemical characteristics and physical habitat for supporting more diverse biological communities. Although the assessments indicate that the physical habitat, temperatures, and dissolved oxygen concentrations at all West Squaw Creek sites are within good to excellent ranges, high concentrations of heavy metals, low pH, high specific conductance, low alkalinity, and high hardness lead to degraded biotic condition at most of the sites within West Squaw Creek.

The biological communities in the main stem of West Squaw Creek in all monitoring reaches downstream of the Early Bird tributary showed signs of being severely affected by ARD. In all these downstream sites, the fish and macro-invertebrate communities had very low diversity or were entirely absent, and periphyton communities shifted toward acid tolerant species.

Results from field sampling also suggest that West Squaw Creek will currently not support fish downstream of the junction with the Early Bird tributary. While fish communities were not sampled at enough sites to provide a complete picture of their distributions in all watersheds of the area, the available data from sampled sites is consistent with a complete loss of fish from the downstream reaches of West Squaw Creek (California Department of Fish and Game, 2001).

The distinct shift in the periphyton community compositions of West Squaw Creek toward dominance of acidophilic species is common in streams subject to ARD (Genter, 1995). In addition, results of this study and previous studies show that *Achnanthes minutissima* often dominates periphyton communities in headwater sites (Stevenson et al., 1991, Vis et al., 1998) and in streams polluted by moderate concentrations of heavy metals (Kelly et al. 1995, Medley and Clements, 1998). However, the reduction in abundance of *A. minutissima* in the most heavily acidified and metals contaminated sites, suggests that a threshold was exceeded. The absence of pollution intolerant *Cymbella* spp, *Synedra* spp., and soft algae that are present in reference streams, provides additional evidence of the negative effects of ARD on West Squaw Creek. Although periphyton species diversity scores and taxa richness are somewhat unrevealing, these metrics have been shown to remain steady during acidic events, while acidophilic species take the place of other acid intolerant taxa (Planas et al., 1989).

There were major changes in all three biological communities at areas within West Squaw Creeks. Both the benthic macroinvertebrate (BMI) and fish communities showed abrupt changes between WSC-2 and WSC-3 while algae were very effective at tracking the pH changes in the stream systems. Changes to the periphyton communities primarily involved community shifts to a community dominated by acidophilic species. The abrupt change in West Squaw Creek also followed the abrupt change in pH and metals in that stream (California Department of Fish and Game, 2001).

There seems to be a slight improvement in some of the biological measures at the downstream sites on West Squaw Creek designated WSC-6 and WSC-7 (UAA, Figure 3-4). Acidophilic diatoms no longer dominate the periphyton community and there is a slight increase in macro-invertebrate taxa associated with an increase in the prevalence of grazing and filtering macro-invertebrates (California Department of Fish and Game, 2001).

3.5 Existing Beneficial Uses

Other beneficial uses assigned to West Squaw Creek, beyond aquatic life uses, include municipal and domestic supply (MUN), irrigation and stock watering (AGR), hydropower (POW), contact and non-contact recreation (REC-1 and REC-2), wildlife habitat (WILD).

With regard to recreational uses, past recreational use surveys conducted by the U.S. Forest Service show that hiking, wildlife viewing, and related REC-2 activities are the primary recreational uses of West Squaw Creek throughout the year. Recreation is limited by inaccessibility of steep terrain and private land ownership. However, limited contact recreation, possibly including swimming, may occur in the creek. There is no municipal supply use of West Squaw Creek, but it is possible that recreational users would drink water in the creek. The creek does provide wildlife habitat. The other uses are not extensive but may have existed since 1975.

3.6 Probable Future Beneficial Uses

Past remedial activities by MRRC in the West Squaw Creek Watershed have reduced overall loading of copper and zinc by 92 percent and 68 percent, respectively. However, this still does not meet the regulatory criteria to support fish. Acid tolerant benthic invertebrates and algae now reside in portions of the creek, once completely void of life.

Available data, best professional judgment, and evaluation of BPT/BMP/BAT indicate that the immediately technically feasible future beneficial uses of West Squaw Creek would be the same as the existing beneficial uses, assuming no changes in upstream hydrology. Impacted portions of West Squaw Creek currently support an acid tolerant benthic invertebrate community. Over time it is the goal of the RWQCB and MRRC to continue to make improvements to stream conditions within the watershed. However, it is unlikely that the stream will ever support beneficial uses of WARM, COLD for fish and other metal or pH sensitive aquatic species, and SPWN due to the concentrations of metals from non-point, uncontrollable sources.

4 WATER QUALITY OBJECTIVES

4.1 General Overview

Water quality objectives are established in Basin Plans by the RWQCB to protect beneficial uses. Water quality objectives are defined in CWC Section 13050 as “the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area”. The CWC and the Basin Plan requires that NPDES permits require dischargers to comply with the water quality objectives necessary to protect all the beneficial uses. The proposed Basin Plan amendments identify removing the designated beneficial uses of WARM, COLD, and SPWN from West Squaw Creek. Since these beneficial uses are the most sensitive to metal concentrations, if they are removed, the water quality objectives to protect those uses would no longer be applicable to discharges to West Squaw Creek. Discharges to West Squaw Creek would continue to be subject to water quality objectives necessary to protect the remaining beneficial uses, including Municipal and Domestic Supply (MUN), Agricultural Irrigation (AGR), Hydropower Generation (POW), Contact and Non-Contact Recreation (REC1 and REC2), and Wildlife Habitat (WILD).

4.2 Current Basin Plan Objectives

The water quality objectives contained in the Basin Plan applicable to West Squaw Creek for cadmium, copper, and zinc are:

<u><i>Parameter</i></u>	Concentration
	<i>µg/l</i> <u>(Dissolved)⁽¹⁾</u>
<i>Cadmium</i>	0.22
<i>Copper</i>	5.6
<i>Zinc</i>	16.0

⁽¹⁾ These concentrations are based on a receiving water hardness of 40 mg/l.

These water quality objectives for the protection of the designated beneficial use for freshwater habitat are based on the toxicity of the most sensitive life stages for spawning salmonids, but are also protective of other WARM, COLD, and SPWN uses. The objectives have been applied to West Squaw Creek because those uses are designated from the downstream tributary, Shasta Lake. Due, in part, to the construction of Shasta Dam, salmonids, do not spawn in West Squaw Creek. West Squaw Creek from the Early Bird Tributary to Shasta Lake does not provide freshwater habitat to fish and other metal or pH sensitive species because of the effects of mining and natural oxidation of the ore deposits. If the beneficial uses are modified in the Basin Plan, the water quality objectives listed above would no longer apply to West Squaw Creek. Other objectives necessary to protect the remaining uses would continue to apply.

4.2.1 Beneficial Use Considerations

The past, current, and potential beneficial uses of West Squaw Creek were considered in developing the recommended changes in beneficial uses. The beneficial uses most sensitive to heavy metal concentrations are those for support of aquatic life (Freshwater Habitat and Spawning). The proposed Basin Plan amendment would be protective of current beneficial uses including acid tolerant aquatic species, municipal and domestic water supply, agriculture, hydropower, contact and non-contact recreation, and wildlife habitat. NPDES permits issued to cover the sources of ARD assure maintenance of the improvements to water quality made since 1975.

4.2.2 Hydrographic Unit Environmental Characteristics Considerations

Adoption of the proposed Basin Plan amendment would not affect the hydrology of West Squaw Creek or downstream water bodies, relative to existing conditions.

4.2.3 Water Quality Conditions That Could Be Reasonably Achieved

Significant work in the West Squaw Creek watershed has been completed to date. BAT and BMP remedial alternatives undertaken in the area have reduced metal loadings in West Squaw Creek by more than 80 percent. Metal loading at point sources has been reduced to 95 percent or better. Point sources now account for less than 20 percent of the total metal loading in West Squaw Creek. Monitoring data from the mine discharges and the receiving waters indicate that even if all portal flows were eliminated and all waste rock dumps adequately controlled, the receiving water concentration of metals from non-point sources in West Squaw Creek would still continue to exceed water quality objectives to protect fish and would prevent the establishment of a warm-water or cold-water fishery or fish spawning habitat in the section of West Squaw Creek under discussion (UAA, Table 2-3, 2-4, and 2-5).

The most stringent promulgated numeric objectives that are protective of the remaining beneficial uses are the objectives necessary to protect municipal and domestic supply. Those objectives are the state drinking water standards that have been incorporated into the Basin Plan as Chemical Constituent objectives:

<u><i>Parameter</i></u>	<u><i>Concentration</i></u> <u><i>µg/l</i></u> <u><i>(Dissolved)</i></u>
<i>Cadmium</i>	<i>5¹</i>
<i>Copper</i>	<i>1000²</i>
<i>Zinc</i>	<i>5000²</i>

¹Primary Maximum Contaminant Level (California Department of Health Services and USEPA.)

²Secondary Contaminant Level (California Department of Health Services and USEPA.)

The current metal concentration and loading documented in the watercourse is measured at the West Squaw Creek Bridge, immediately upstream of Shasta Lake. The current average annual concentration of cadmium, copper, and zinc measured at the West Squaw Creek Bridge, based on data from 2001 through 2003 is 2.28 ug/l, 68.89 ug/l, and 518.44 ug/l, respectively). These concentrations are considerably lower than the drinking water standards. The metal loading of cadmium, copper, and zinc to West Squaw Creek as measured at the West Squaw Creek Bridge over the same time period averages 0.64 lbs/day for Cd, 22.86 lbs/day for Cu, and 33.54 lbs/day for Zn, with an average total metal loading of 155 lb/day (see Water Quality Appendix of UAA, West Squaw Creek Bridge Dissolved Metal Loading, 2001 thru 2003).

The monthly data presented in the UAA are variable as a result of variations in stream flows and metal discharges from precipitation events, season changes, and climate changes. A specific, instantaneous number is therefore unrealistic and meaningless for regulatory compliance and data must be averaged over an extended period of time to reduce the natural variability.

In order to assure no backsliding, and provide a realistic measurement of future improvements, the owners of the mines in the watershed must maintain the facilities and remedial improvements to meet or improve the current water quality levels. To assure the remedial activities and facilities are maintained, the RWQCB will maintain a NPDES permit on the mine owners in the watershed requiring implementation and maintenance of BMPs as they become available, and require compliance with requirements to protect the remaining beneficial uses in West Squaw Creek and downstream tributaries. Federal policies and State and Regional Board policies as described in Chapter 5 provide the necessary regulatory authority to enforce this requirement.

4.2.4 Economic Considerations

Given the steep inaccessible nature of the terrain, few remedial treatments are available to reduce the discharges in the West Squaw Creek drainage to meet current Basin Plan standards. MRRC has undertaken significant remedial actions following BMP for non-point sources and BAT for point source controls. Significant improvements have been made in reducing metal loadings to Shasta Lake. Today non-point sources now contribute approximately 93 percent of the metal loading in West Squaw Creek. No external economic effects are expected to be incurred by the local public, MRRC, or any other parties as a result of adopting the proposed beneficial uses. Regulatory controls will continue to be applied to the sources of ARD and require the implementation of BMPs to reduce the impacts of ARD to West Squaw Creek.

4.2.5 Need for Housing

If adopted, the proposed change would have no impact on the need for, or ability to develop housing in the watershed.

4.2.6 Need to Develop and Use Recycled Water

If adopted, the proposed change would not adversely impact the ability to develop and use recycled water in the watershed.

5.0 CONSISTENCY WITH FEDERAL AND STATE LAWS AND POLICIES

Federal and State agencies have adopted water quality control policies and water quality control plans to which Regional Water Board actions must conform. The following section describes each of the policies that are applicable to the proposed Basin Plan amendments. It also discusses applicable Regional Water Board policies that are contained in the Basin Plan.

5.1 Antidegradation

The Federal Antidegradation policy (from 40 CFR 131.12) is :

“(a) The State shall develop and adopt a statewide antidegradation policy and identify the methods for implementing such policy pursuant to this subpart. The antidegradation policy and implementation methods shall, at a minimum, be consistent with the following:

(1) Existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected.

(2) Where the quality of the waters exceed levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the State finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the State's continuing planning process, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located. In allowing such degradation or lower water quality, the State shall assure water quality adequate to protect existing uses fully. Further, the State shall assure that there shall be achieved the highest statutory and regulatory requirements for all new and existing point sources and all cost-effective and reasonable best management practices for non-point source control.

(3) Where high quality waters constitute an outstanding National resource, such as waters of National and State parks and wildlife refuges and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

(4) In those cases where potential water quality impairment associated with a thermal discharge is involved, the antidegradation policy and implementing method shall be consistent with section 316 of the Act.”

Title 40 CFR Section 131.12(a)(1) applies to discharges to West Squaw Creek. The beneficial uses of WARM, COLD, and SPWN (as currently defined in the Basin Plan) are not existing uses as that term is defined in 40 CFR 131.3. As described herein, the water quality of West Squaw Creek has not been high enough to protect WARM, COLD, and SPWN (as

currently defined in the Basin Plan) at least since 1941. It is not feasible to reduce discharges of metals to concentrations sufficient to support WARM, COLD, or SPWN (as currently defined in the Basin Plan) because even if all point source discharges were controlled, human induced and naturally occurring non-point source discharges would continue to cause the water to exceed protective concentrations. Therefore, removing the beneficial uses of WARM, COLD, and SPWN (as currently defined in the Basin Plan) is consistent with the federal antidegradation policy. The proposed Basin Plan amendments will not affect existing water quality. Water quality in West Squaw Creek will continue to improve incrementally as technology becomes available and best management practices are applied to point and non-point sources as required under the NPDES permit issued to MRRC.

5.2 State Water Board Policies

5.2.1 The State Policy for Water Quality Control

This policy is the basis for the State Water Board to protect water quality through the implementation of water resources management programs. The proposed Basin Plan amendments are consistent with this policy in that the amendments do not affect the regulation of point and non-point sources of pollutants in West Squaw Creek under the NPDES program. Water quality in West Squaw Creek will continue to improve incrementally as technology becomes available and best management practices are applied to point and non-point sources as required under the NPDES permit issued to MRRC.

5.2.2 State Water Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Water in California"

State Water Board Resolution No. 68-16, Statement of Policy with Respect to Maintaining High Quality of Water in California, is summarized on page IV-8.00 of the Basin Plan as follows:

"The State Water Board adopted this policy on 28 October 1968. The policy generally restricts the Regional Water Board and dischargers from reducing the water quality of surface or ground waters even though such a reduction in water quality might still allow the protection of the beneficial uses associated with the water prior to the quality reduction. The goal of the policy is to maintain high quality waters.

Changes in water quality are allowed only if the change is consistent with maximum benefit to the people of the State; does not unreasonably affect present and anticipated beneficial uses; and, does not result in water quality less than that prescribed in water quality control plans or policies.

USEPA water quality standards regulations require each state to adopt an "antidegradation" policy and specify the minimum requirements for the policy (40

CFR 131.12). Resolution No. 68-16 preceded the federal policy and applies to both ground and surface waters. The State Water Board has interpreted State Water Board Resolution No. 68-16 to incorporate the federal antidegradation policy. Therefore, the federal antidegradation policy must be followed where it is applicable. The federal antidegradation policy applies if a discharge or other activity, which began after 28 November 1975, will lower surface water quality. Application of the federal policy may be triggered by water quality impacts or mass loading impacts to receiving waters. Resolution No. 68-16 is Appendix Item 2; the federal policy is Appendix Item 39.”

The proposed Basin Plan amendments do not result in a reduction of water quality from that which currently exists and which has occurred in the past. Remedial activities and in the watershed using BAT have reduced metal loadings in West Squaw Creek by more than 80 percent. Metal loading at point sources has been reduced to 95 percent or better. Point sources now account for approximately less than 20 percent of the total metal loading in West Squaw Creek. Water quality in West Squaw Creek will continue to improve incrementally as technology becomes available and best management practices are applied to point and non-point sources of metal loading.

5.2.3 State Water Board Resolution No. 88-63, Sources of Drinking Water Policy

This policy states that all waters of the State are to be protected as existing or potential sources of municipal and domestic supply water. The proposed Basin Plan amendments are consistent with this policy. West Squaw Creek is tributary to Shasta Lake and the Sacramento River, both sources of drinking water. West Squaw Creek has and will continue to maintain the beneficial uses of municipal and domestic water supply.

5.2.4 State Water Board Resolution No. 90-67, Pollutant Policy Document

The Pollutant Policy Document requires, in part, that the RWQCB develop a mass emission strategy for limiting loads of heavy metals, among other pollutants, from entering the Delta. Because water from West Squaw Creek enters Shasta Lake and the Sacramento River, this policy applies to West Squaw Creek. Removing the beneficial uses for protection of freshwater habitat and spawning from West Squaw Creek will allow MRRC, the owners of copper mines in West Squaw Creek, to focus its resources on reducing metal loading from larger, more significant sources of metal discharges to Little Backbone Creek and Spring Creek, each tributary to the Sacramento River. Therefore, the proposed amendments are consistent with this policy.

5.2.5 Non-point Source Management Plan

This plan describes general management approaches to address non-point sources of pollution including voluntary implementation of best management practices, regulatory based encouragement of best management practices, and adopted effluent limits (through federal permits). The plan allows for the least stringent approach to be followed to protect water quality and requires more stringent measures if water quality objectives are not achieved.

The proposed Basin Plan amendments to modify the beneficial uses of WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and SPWN recognize that these uses never existed in the watershed and will not exist in the foreseeable future. However remedial activities, including implementation of BMPs are required by the NPDES permit issued to MRRC, owner of the abandoned copper mines in West Squaw Creek. Water quality in West Squaw Creek will continue to improve incrementally as technology becomes available and best management practices are applied to non-point sources of metals in the watershed.

5.3 Regional Water Board Policies

5.3.2 Controllable Factors Policy

This policy requires controllable water quality factors be implemented to prevent further degradation of water quality where objectives have been exceeded. The proposed amendments do not impact water quality, but remove the designated, but not existing, beneficial uses in West Squaw Creek. The conditions that have impacted water quality have been significantly reduced with the application of BMPs as required by a NPDES permit, however, metal concentrations in the watercourse still exceed conditions to the point where the beneficial uses of WARM, COLD, and SPWN are affected. Continued application of BMPs to point and non-point sources of ARD as required by the NPDES permit for the mine owners in the watercourse is consistent with this policy.

5.3.3 The Water Quality Limited Segment Policy

This policy requires additional treatment beyond minimum federal requirements on discharges to Water Quality Limited Segments. The policy states that dischargers will be allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment. West Squaw Creek is listed in the Basin Plan as a Water Quality Limited Segment.

The proposed Basin Plan amendments are to modify the beneficial uses of WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove the beneficial use for SPWN from a portion of West Squaw Creek and do not result in a reduction of water quality from that that currently exists or has existed in the documented past. The proposed Basin Plan amendments do not affect the requirements for control of discharges of metals to the watercourse. Such discharges are regulated under a NPDES permit which required implementation of BMPs to control ARD and are consistent with this policy.

5.3.4 Antidegradation Implementation Policy

This policy requires the RWQCB to apply and implement SWRCB Resolution No. 68-16 when regulating discharges of pollutants. The RWQCB policy requires an assessment of the discharge that could affect waters of the State and to apply methods of best practicable treatment or control to maintain high quality water.

The proposed Basin Plan amendments do not result in a reduction of water quality from that that currently exists or has existed in the documented past. Remedial activities and in the watershed have reduced metal loadings in West Squaw Creek by more than 80 percent. Metal loading at point sources has been reduced to 95 percent or better. Point sources now account for approximately less than 20 percent of the total metal loading in West Squaw Creek. Water quality in West Squaw Creek will continue to improve incrementally as technology becomes available and best management practices are applied to point and non-point sources of metal loading.

5.3.5 Total Maximum Daily Load Program

The Upper Sacramento River is listed as an impaired waterbody under Section 303(d) of the CWA (303(d) List). This 25 mile river segment between Keswick Dam and Cottonwood Creek, is impaired by dissolved cadmium, copper and zinc and unknown toxicity. The report titled Upper Sacramento River TMDL for Cadmium, Copper, and Zinc Report (TMDL Report) documents the current conditions on the upper Sacramento River and the plans for implementation of remediation activities and monitoring. The TMDL Report states that RWQCB staff expects that remediation activities scheduled for Iron Mountain Mine (IMM) and other mines in the Shasta Lake watershed during the next five years will address the water quality impairments. The TMDL water management strategy includes remediation activities at IMM and other mines in the watershed, continued monitoring by regional and Federal agencies, increased RWQCB monitoring of Shasta Lake to identify causes of periodic increases in dissolved metals concentrations in Shasta Dam releases, and additional monitoring by NPDES discharges during the next five years.

Activities included in the TMDL are currently underway by RWQCB staff, including increased remedial activities at mines (sources of ARD and metals) in watersheds tributary to Shasta Lake, monitoring in Shasta Lake at multiple depths and locations to better define metal transport in the lake, and developing a UAA for removal of selected beneficial uses in the West Squaw Creek watershed.

Significant remedial activities at mines in the Horse Creek and Town Creek watershed have been scheduled and are underway, including rehabilitation of collapsed mine portals and installation of concrete bulkhead seals. Over the next few years, significant remedial activities are scheduled for the mines in the Little Backbone Creek watershed, currently the largest source of metals loading to Shasta Lake.

RWQCB staff has done extensive sampling in Shasta Lake to help define the seasonal horizontal and vertical distribution of metals within the lake and has issued a staff report titled *Interim Report, Metals Distribution Within Shasta Lake, Shasta County, California*, (May 2003).

The proposed Basin Plan Amendments are consistent with the TMDL Report.

5.4 Endangered Species Act

5.4.1 Overview And Background

USEPA's approval of new and revised state water quality standards is a federal action subject to the consultation requirements of Section 7(a)(2) of the Endangered Species Act (ESA (65 FR 24647 (April 27, 2000))). Section 7(a)(2) of the ESA states that:

“Each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of designated critical habitat.”

Although consultation under the ESA is USEPA's obligation, the USEPA and the states acknowledge that states can assist USEPA in fulfilling its ESA obligations and have a role in assuring that state standards adequately protect aquatic life and the environment, including threatened and endangered species (65 FR 24643).

This section of the Staff Report has been prepared to assist in meeting the RWQCB's obligations under ESA Section 7(a)(2) as part of its action to approve the proposed Basin Plan amendments for West Squaw Creek. Appendix B contains a review of issues relating to Species of Special Concern.

5.4.2 California Department of Fish & Game (DFG)

The DFG has coordinated extensively with the RWQCB in reviewing alternatives for remedial actions at the mines of West Squaw Creek. DFG has participated in meetings and in preparation of the UAA. DFG continues to be involved in the regulatory process in the development of revised beneficial uses for West Squaw Creek.

DFG staff conducted the biological assessment of West Squaw Creek and the information presented in this Staff Report concerning the current biological conditions of West Squaw Creek herein is taken from the DFG report.

5.4.3 National Marine Fisheries Service ESA Considerations

National Marine Fisheries Service (NMFS) has regulatory jurisdiction over anadromous salmonids, and is the agency responsible for listing steelhead as threatened under the federal ESA. Central Valley steelhead was listed as a federally listed species under the federal ESA (63 FR 13347 (March 19, 1998, effective May 18, 1998)). Subsequent to that listing, NMFS promulgated its Final Rule defining critical habitat for steelhead in the Central Valley of California “Evolutionary Significant Unit” (ESU) on February 16, 2000 (65 FR 7764).

In promulgating the critical habitat designation, NMFS was clear to point out that the available information allowed it only to characterize “basin-level designations,” and that it

cannot yet “...depict salmonid habitats in a consistent manner or at a fine geographic scale...” (65 FR 7767). Consequently, although NMFS has stated its preference to identify critical habitat by designating specific areas accessible to the species within the range of hydrologic units within each ESU, the watershed-based description does not provide “...the level of resolution to define the species’ presence or absence in specific local creeks and streams...” (65 FR 7767).

Discussions with NMFS indicate they do not believe they have a specific regulatory interest in the proposed action due to the location of the action behind Shasta Dam, lack of anadromous access to West Squaw Creek, and the issuance of the TMDL for the Upper Sacramento River for Cadmium, Copper and Zinc. NMFS did express an interest in the UAA process and desire to be included in the correspondence to develop better understanding of the UAA process.

5.4.4 U. S. Fish And Wildlife Service ESA Considerations

The U. S. Fish and Wildlife Service (USFWS) has regulatory jurisdiction over all species listed under the Federal ESA other than anadromous salmonids, which fall under the jurisdiction of NMFS. The proposed action, for which consultation with USFWS may be required, is modification of beneficial uses. In the event that a listed plant, amphibian, reptile, or other species for which USFWS has jurisdiction were to use West Squaw Creek and/or its riparian corridor, USEPA’s action of approving the proposed change in beneficial uses would not adversely affect the species, based on the scientific information compiled and contained within this report. This is primarily because the proposed amendments would not affect creek hydrology, nor would they change water quality by magnitudes that could affect these organisms.

5.4.5 Summary Of ESA Concerns

Under the ESA, it is illegal to “take” a listed species without a permit or other authorization 16 U.S.C. § 1538(a). There can be a “take” of a species through habitat modification only to the extent that such modification results in the actual killing or injury to a member of the species (*Babbitt v. Sweet Homes Chapter of Communities for a Greater Oregon*, 515 U.S. 687 (1995)). Because approval and implementation of the Proposed Action would not cause a change in the hydrology or water quality of West Squaw Creek, relative to existing conditions, such approval and implementation would not cause or increase the risk for “take” of endangered species that may use the waters of West Squaw Creek.

A summary of possible ESA concerns in the vicinity of the proposed action is included in Appendix B of this report.

6.0 MONITORING AND SURVEILLANCE PROGRAM

Chapter 5 of the Basin Plan describes the methods and programs that the RWQCB uses to acquire water quality information. Acquisition of data is a basic need of a water quality control program and is required by the CWA and the Porter-Cologne Water Quality Control Act. A monitoring plan is also an essential element to assure no backsliding occurs in the metal loading in West Squaw Creek and that continued application of remedial activities and best management practices produce effective results.

This section contains a description of the monitoring and surveillance activities currently undertaken by the RWQCB and MRRC. Monitoring and surveillance includes monitoring by MRRC, monitoring and investigations by the RWQCB, and surveillance and inspections by the RWQCB.

6.1 Monitoring Activities

6.1.1 Discharger Monitoring

Monitoring of West Squaw Creek is conducted by MRRC as required by an NPDES permit. Long term monitoring data of West Squaw Creek and other watersheds have been collected and compiled by MRRC in an ACCESS database. Surface waters upstream and down stream of the abandoned mines are sampled quarterly and analyzed for copper, zinc, cadmium, pH, priority pollutant metals and flow. A monitoring station in West Squaw Creek immediately upstream of Shasta Lake has been established to provide data on the long term effectiveness of remedial activities and to assure the current water quality is maintained or improved.

MRRC has also installed continuous monitoring devices in West Squaw Creek which measure stream flow, conductivity, and pH. The monitoring program is described in a report titled *MRRC, Shasta Area Mines, Site-wide Water Monitoring Network Work Plan, Shasta County, California*, (MRRC, June 2002).

Monitoring required by the NPDES permit also includes discharges from all mine portals and passive treatment systems on a quarterly basis. Samples are analyzed for copper, zinc, cadmium, pH, priority pollutant metals and flow.

Monitoring of metals in surface waters not only includes West Squaw Creek, but other drainages tributary to Shasta Lake that are impacted by ARD from abandoned copper mines, including Little Backbone Creek, Horse Creek, and Town Creek. NPDES permits issued to owners of the abandoned copper mines require monitoring of discharges from the mines and the impacted watercourses. All results are submitted to the RWQCB.

6.1.2 RWQCB Surveillance and Inspection

RWQCB surveillance and inspection activities for West Squaw Creek include those currently being conducted under the NPDES Program. These include, but are not limited to, the following activities:

- 1) Inspections of the MRRC owned mines in West Squaw Creek, the passive treatment systems, and monitoring, construction, and maintenance records;
- 2) Inspections of the physical, chemical, and biological characteristics of West Squaw Creek upstream and downstream from the sources of ARD; and
- 3) Review of discharger-submitted self monitoring reports.

In addition, the RWQCB will continue to conduct compliance monitoring to determine permit compliance and validate self-monitoring reports. Discharger compliance monitoring is the responsibility of the RWQCB staff.

RWQCB staff conducts a sampling program in Shasta Lake to monitor the seasonal and spatial variations of metals in the water column. Monitoring stations have been established throughout the major tributary arms of the lake, near tributaries which contain sources of ARD, and near Shasta Dam. The Bureau of Reclamation and RWQCB staff also monitor metal concentrations in the Sacramento River below Shasta Dam to assure discharges of metals from the metal sources above Shasta Dam and Iron Mountain Mine below the dam do not result in concentrations of metals which exceed the water quality objectives contained in the Basin Plan.

Finally, RWQCB staff conducts investigations of complaints, if any are made to the RWQCB. Complaints from public or governmental agencies to the RWQCB regarding the discharge of pollutants or creation of nuisance conditions would be investigated and pertinent information collected.

6.2 Use of Monitoring Data

Monitoring data collected is used to:

- gage the effectiveness of the remedial activities at West Squaw Creek and the various other mines and impacted tributaries to Shasta Lake,
- determine whether the water quality objectives for Shasta Lake and the Sacramento River are being achieved;
- characterize resultant instream and lake conditions, both chemical and biological, and

- assess the relative health of West Squaw Creek's, Shasta Lake's and the Sacramento River's aquatic ecology and other beneficial uses in the near-term and future.

7.0 ENVIRONMENTAL REVIEW

7.1 Introduction

The planning process for Basin Plans has been certified by the Secretary of Resources as a regulatory program pursuant to Public Resources Code Section 21080.5, and California Environmental Quality Act (CEQA) Regulations 14 CCR Section 15251(g). Pursuant to Public Resources Code Section 21080.5(c), the Basin Plan planning process is exempt from the provisions of the CEQA that relate to preparation of Environmental Impact Reports and Negative Declarations. This chapter satisfies the requirements of SWRCB regulations for *Implementation of CEQA, Exempt Regulatory Programs*, which are found in Title 23 CCR, Division 3, Chapter 27, Article 6, beginning at section 3775. Title 23 Section 3777 requires preparation of:

- An environmental checklist
- A written report containing a brief description of the proposed activity or project, reasonable alternatives to the proposed activity, and mitigation measures to minimize any significant adverse environmental impacts of the proposed activity

7.2 Proposed Project

Amendments to the listed beneficial uses of West Squaw Creek are being sought by the RWQCB, with support from DFG and MRRC. In addition, technical meetings were held with the NMFS, USFWS, and EPA to help guide the development of the proposed amendments. Amendments to the Basin Plan are made by the RWQCB pursuant to Water Code section 13240 using a structured process involving scientific peer review, full public participation, state environmental review, and state and federal agency review and approval. In this case, the proposed project is approval of proposed changes to the identified beneficial uses of West Squaw Creek. These changes will be protective of existing beneficial uses in West Squaw Creek.

Compliance with the proposed amendments to the Basin Plan would not result in any changes in West Squaw Creek, relative to conditions that currently exist.

The action proposed in this Staff Report consist of modifying the designated, beneficial use of warm and cold Freshwater Habitat (WARM and COLD) to not include fish and other metal or pH sensitive aquatic species, and remove the designated, but not existing, beneficial use of warm and cold water Spawning (SPWN) (as defined in the Basin Plan) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake.. The actual changes in the Basin Plan proposed include the modification of the beneficial uses of the identified segment of West Squaw Creek in Table II-1 of the Basin Plan and to modify the geographical extent of the applicable Water Quality Objectives in Table III-1 of the Basin Plan as shown on the following pages.

SURFACE WATER BODIES AND BENEFICIAL USES

	Surface Water Bodies (1)	Hydro Unit Number	MUN	Agri-culture			Industry			Recreation			Freshwater Habitat(2)		Migration		WILD	NAV
				Irrigation	Stock	Watering	PROC	IND	POW	REC-1	Canoeing (1) and Rafting	Other	WARM	COLD	Warm (3)	Cold (4)		
1	McCloud River	505.	E	E	E				E	P	E	E	E	E			E	
2	Goose Lake	527.20											E	E			E	
3	Pit River		E	E	E					P	E	E	E	E			E	
4	North Fork, South Fork, Pit River	526.00	E	E	E								E	E			E	
5	Confluence of Forks to Hat Creek	526.35	E	E	E				E	E	E	E	E	E			E	
6	Fall River	526.41	E	E	E				E	E	E	E	E	E			E	
7	Hat Creek	526.30		E	E				E	E	E	E	E	E			E	
8	Baum Lake	526.34		E	E				E	E	E	E	E	E			E	
9	Mouth Of Hat Creek To Shasta Lake	526.	E	E	E				E	E	E	E	P	E			E	
10	Sacramento River	525.22		E	E								E	E			E	
11	Source To Box Canyon Reservoir	525.22		E	E								E	E			E	
12	Lake Siskiyou	525.22		E	E								E	E			E	
13	Box Canyon Dam to Shasta Lake	525.2	E	E	E					E	E	E	E	E			E	
14	Shasta Lake	506.10	E	E	E				E	E	E	E	E	E			E	
15	West Squaw Creek		E	E	E				E	E	E	E	E	E			E	
16	Shasta Dam To Colusa Basin Drain	524.61	E	E	E				E	E	E	E	E	E			E	
17	Whiskey Town Reservoir	524.62	E	E	E				E	E	E	E	E	E			E	
18	Clear Creek Below Whiskeytown	507.3	P	E	E				E	E	E	E	E	E			E	
19	Cow Creek	507.12		E	E				E	E	E	E	E	E			E	
20	Battle Creek	524.3	E	E	E				E	E	E	E	E	E			E	
21	Cottonwood Creek	509.63	E	E	E				E	E	E	E	E	E			E	
22	Antelope Creek	509.42	E	E	E				E	E	E	E	E	E			E	
23	Mill Creek	523.10	E	E	E				E	E	E	E	E	E			E	
24	Thomes Creek	509.20	E	E	E				E	E	E	E	E	E			E	
25	Deer Creek	509.14	E	E	E				E	E	E	E	E	E			E	
26	Big Chico Creek	522.00		E	E				E	E	E	E	E	E			E	
27	Stony Creek	522.33		E	E				E	E	E	E	E	E			E	
28	East Park Reservoir	522.12		E	E				E	E	E	E	E	E			E	
29	Black Butte Reservoir			E	E				E	E	E	E	E	E			E	
30	Butte Creek			E	E				E	E	E	E	E	E			E	
31	Sources to Chico	521.30	E	E	E				E	E	E	E	E	E			E	
32	Below Chico, Including Butte	520.40		E	E				E	E	E	E	E	E			E	
33	Colusa Basin Drain	520.21		E	E				E	E	E	E	E	E			E	

Note: Surface waters with the beneficial uses of Groundwater Recharge (GWR), Freshwater Replenishment (FRSH), and Preservation of Rare and Endangered Species (RARE) have not been identified in this plan. Surface waters of the Sacramento and San Joaquin River Basins falling within these beneficial use categories will be identified in the future

L = Existing Limited Beneficial Use as part of the continuous planning process to be conducted by the State Water Resources Control Board.

a = Cold And Warm Freshwater Habitat does not include fish and other metal or pH sensitive aquatic species in West Squaw Creek from Early Bird Tributary to Shasta Lake

Bacteria

In waters designated for contact recreation (REC- I), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period shall not exceed a geometric mean of 200/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 400/100 ml.

For Folsom Lake (50), the fecal coliform concentration based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 100/100 ml, nor shall more than ten percent of the total number of samples taken during any 30-day period exceed 200/100 ml.

Biostimulatory Substances

Water shall not contain biostimulatory substances which promote aquatic growths in concentrations that cause nuisance or adversely affect beneficial uses.

Chemical Constituents

Waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses. The chemical constituent objectives in Table III-1 apply to the water bodies specified. Metal objectives in the table are dissolved concentrations. Selenium,

molybdenum, and boron objectives are total concentrations. Water quality objectives are also contained in the Water Quality Control Plan for Salinity, adopted by the State Water Board in May 1991.

At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain concentrations of chemical constituents in excess of the maximum contaminant levels (MCLs) specified in the following provisions of Title 22 of the California Code of Regulations, which are incorporated by reference into this plan: Tables 6443 I-A (Inorganic Chemicals) and 6443 I-B (Fluoride) of Section 6443 1, -, Table 64444-A (Organic Chemicals) of Section 64444, and Tables 64449-A (Secondary Maximum Contaminant Levels Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of Section 64449. This incorporation-by-reference is prospective, including future changes to the incorporated provisions as the changes take effect. At a minimum, water designated for use as domestic or municipal supply (MUN) shall not contain lead in excess of 0.015 mg/l. The Regional Water Board acknowledges that specific treatment requirements are imposed by state and federal drinking water regulations on the consumption of surface waters under specific circumstances. To protect all beneficial uses the Regional Water Board may apply limits more stringent than MCLs.

TABLE III- I
TRACE ELEMENT WATER QUALITY OBJECTIVES

<u>CONSTITUENT</u>	<u>MAXIMUM CONCENTRATION</u> ^a (mg/l)	<u>APPLICABLE WATER BODIES</u>
Arsenic	0.01	Sacramento River from Keswick Dam to the I Street Bridge at City of Sacramento (13, 30); American River from Folsom Dam to the Sacramento River (51); Folsom Lake (50); and the Sacramento-San Joaquin Delta.
Barium	0.1	As noted above for Arsenic.
Boron	2.0 (15 March through 15 September) 0.8 (monthly mean, 15 March through 15 September) 2.6 (16 September through 14 March), 1.0 (monthly mean, 16 September through 14 March) 1.3 (monthly mean, critical year ^b)	San Joaquin River, mouth of the Merced River to Vernalis
Cadmium	0.00022 ^c	Sacramento River and its tributaries above State Hwy 32 bridge at Hamilton City, <u>except for West Squaw Creek from the Early Bird Tributary to Shasta Lake.</u>

7.3 Environmental Checklist

7.3.1 Project Title

Basin Plan Amendment to the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins for Change of Beneficial Uses for West Squaw Creek, Shasta County.

7.3.2 Lead Agency Name and Address

California Regional Water Quality Control Board, Central Valley Region
Redding Office
415 Knollcrest, Suite 100
Redding, CA 96002

7.3.3 Contact Person and Phone Number

Phil Woodward (530) 224-4853

7.3.4 Project Location

West Squaw Creek in Shasta County, California. West Squaw Creek is tributary to Shasta Lake.

7.3.5 Project Sponsor's Name and Address

California Regional Water Quality Control Board, Central Valley Region
Sacramento Office
11020 Sun Center Drive
Rancho Cordova, CA 95670-6114

7.3.6 General Plan Designation

Not applicable

7.3.7 Zoning

Not applicable

7.3.8 Description of Project

The California Regional Water Quality Control Board, Central Valley Region (RWQCB) is proposing to modify the designated beneficial use of warm and cold Freshwater Habitat (WARM and COLD) to not include fish and other metal or pH sensitive aquatic species, and remove the designated, but not existing, beneficial use of warm and cold water Spawning

(SPWN) (as defined in the Basin Plan) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake due to impacts of ARD from historic mining operations.

7.3.9 Surrounding Land Uses and Setting

The area affected by the proposed amendments is West Squaw Creek. The West Squaw Creek Watershed encompasses approximately 15.5 square miles, and flows in a westerly direction into Shasta Lake. Approximately one mile upstream from Shasta Lake, West Squaw Creek divides into the North and South Forks, which drain 8.5 and 5 square miles, respectively. The topography of the watershed is characterized by very steep, rocky slopes; few slopes are less than 35 degrees and slopes of 50 degrees or more are common. Elevations range from 1000 feet above mean sea level (MSL) at the confluence of West Squaw Creek with Lake Shasta, to 4649 feet above MSL at East Shirt Peak, the highest point in the watershed. Numerous bluffs and cliffs can be encountered in the area, making travel difficult. While some old jeep and logging trails exist, the primary mode of transportation is by foot.

The climate of the area is typified by hot summers and cool, wet winters. At the higher elevations, significant snowfall can make roads impassable to vehicle traffic for extended periods. Daytime temperatures of 110 degrees are common from June through September, and higher temperatures have been observed. These high temperatures last for approximately two to three weeks and are then followed by a period where temperatures fluctuate around 95 degrees. By contrast, winter temperatures drop down below freezing at the higher elevations where snow is common. The average temperature from November to March is approximately 49 degrees. Precipitation in the area varies from about 55 inches at lower elevations to 80 inches at higher elevations. The mean annual precipitation based on the long-term data from a weather station at Shasta Dam is about 60 inches and is representative of precipitation that can be expected for the lower elevations of the West Squaw Creek Watershed (NOAA, 1996). Most of the precipitation occurs between November and April, and snow is common at higher elevations between November and March. The elevations of the ridges defining the watershed divides average 3500 feet above MSL. The sharp differences in elevation cause considerable local variation in temperature and precipitation.

The vegetation in the watershed varies with altitude. Chaparral, including dense stands of manzanita (*Arctostaphylos sp.*) and other brush species, predominate at the lower elevations near the streambed. Vegetation within the balance of the watershed include digger pine (*Pinus sabiniana*), ponderosa pine (*Pinus ponderosa*), sugar pine (*Pinus lambertiana*), Douglas fir (*Pseudotsuga taxifolia*), California black oak (*Quercus kelloggii*), canyon live oak (*Q. wislizenii*), and interior live oak (*Q. chrysolepis*). This portion of Northern California has a relatively high fire frequency return interval. Prior to intensive fire suppression that began in the early 1900s, the fire return interval for the area ranged from 7-11 years. Fires were numerous, but typically small in size (0.25 to 2 acres) with the largest known historical fire being approximately 50 acres in size.

The watershed lies within the West Shasta Copper Mining District, and its geology has been described in detail by Kinkel et al. (1956). The upper reaches of the South Fork, upstream from mining activity, consist mainly of clastic shales and siltstones. The ore zone of the mining district is contained within the Balaklala rhyolite, which is composed of volcanic flows, breccia, and tuffs of Middle Devonian age. The ore bodies of the West Shasta Copper Mining District are mainly massive pyrite (FeS_2) with smaller amounts of chalcopyrite (CuFeS_2) and sphalerite (ZnS) with minor quantities of gold and silver. Advanced weathering of these massive sulfides has produced extensive gossan deposits throughout the West Squaw Creek Watershed. Gossans are the oxidized caps over sulfide ore bodies from which the metal sulfides have been oxidized and partially leached by percolating ground waters, leaving a porous cap made up primarily of iron oxyhydroxides (e.g. hematite, Fe_2O_3 , and goethite, FeOOH) and quartz. Gossan formations in the region have been divided into massive gossans, derived from the weathering of massive sulfide ore, and disseminated gossan, derived from the weathering of disseminated pyrite (Kinkel et al., 1956).

The soil mantle in this area is thin, discontinuous, and only partially developed. Numerous slump scarps reveal that landslides are common and have occurred in areas where slopes are steep. Landslide features that expose gossan rock to additional weathering increase the surface area for leaching of ARD.

The numerous small tributary streams to the South Fork of West Squaw Creek are generally intermittent. There are a number of springs along the canyon walls that maintain the base flow in West Squaw Creek. Most streams in the watershed are of a steep gradient and have been scoured to bedrock. These stream reaches have little vegetation and generally exhibit poor fish passage and lack habitat elements to support fish.

Groundwater movement in the area flows in a pattern typical in fractured impermeable rock. Water moves from the numerous small feeding fractures and fissures to large trunk channels furnished by larger fractures. Springs have developed where fractures intercept the surface. The mine workings have opened underground galleries in areas in which vadose water collects and discharges through mine tunnels and adits. The underground workings serve to provide both storage and interception galleries, which allow surface flow to percolate through the ground prior to discharge to West Squaw Creek.

This subsequent discharge of groundwater into West Squaw Creek and its tributaries has a very low pH level due to its exposure with the localized acidic rock. Additionally, landslides and mass wasting of surface soils direct additional rock and soil (with acidic characteristics) into the waterways and channels, where it can be exposed to surface water. This material is then leached by surface water, further reducing the pH.

Weathering of the sulfide minerals present in the West Shasta Copper Mining District produces acid-enriched and metal-enriched waters. Pyrite (FeS_2) is the most common metal-sulfide mineral in the massive sulfide deposits in the region, making up about 90 percent of the metallic mineral content. The remaining 10 percent of the sulfide deposits is primarily comprised of chalcopyrite (CuFeS_2) and sphalerite (ZnS). All of the metals and sulfur

associated with these minerals are in a chemically reduced state; therefore, they are only stable in reducing conditions (reducing and oxidizing conditions as used here are relative terms that pertain to the availability of oxygen for chemical reactions. Generally, oxidizing conditions are found at the earth's surface and reducing conditions become more prevalent with depth below the surface). When exposed to the oxygen-rich atmosphere at the earth's surface, the natural response of the metals and sulfur in the minerals is to react with oxygen to achieve a more stable oxidized state. The presence of water enhances the rate of the reaction because it provides a medium where the transfer of reactants can take place.

The reaction is catalyzed by a bacteria, *Thiobacillus ferrooxidans*. This reaction completes the cycle of transforming the primary component of massive sulfide deposits (pyrite) to a stable mineral under oxidizing conditions. Iron oxides such as hematite and goethite are the primary components of gossans in the West Shasta Copper Mining District and around the world.

Near-surface mineralized areas are the principle source of natural contaminants to the water. Such mineralization occurs in rocks that have been highly altered by hot fluids (hydrothermal fluids) that leave behind zones or veins of potential economically recoverable mineral deposits, within a halo of altered, strongly pyritic rock. The halo area may contain several percent pyrite (FeS_2) that, when weathered, generates sulfuric acid. Such acid causes more minerals and rock to dissolve, thus leading to high metal concentrations in surface waters. The combined activities of the metals and acid inhibit or preclude the formation of soil and vegetation, and the lack of soil cover protection leads to high erosion rates, relative to surrounding unmineralized areas. Such mineral processes and their environmental consequences are a principle focus of this report because of effects that such processes have on erosion rates and subsequent water quality, and ultimately their effect on aquatic life.

The high percentage of mineralized areas in the West Squaw Creek drainage are affected by freeze-thaw cycles, downslope movement, and erosion of the steep slopes. Locally, these erosive processes, which serve to disaggregate the mineralized rocks at rates far in excess of the unmineralized rocks, are so extreme that soils have no chance to develop, or if developed locally, may be washed away by undercutting. The loss, or non-formation, of soil cover, in addition to the steep terrain, promotes physical erosion at a much quicker rate and the release of sediments, acid, and dissolved metals to the surface waters cause water pollution.

Mining activities of the past at West Squaw Creek have also promoted the process of physical and chemical weathering by imposing on the natural cycle a man-induced component of physical weathering disaggregation. Rock disaggregation, which results from blasting and crushing, exposes extra rock to chemical weathering by increasing the net surface area that is available to water and atmospheric oxygen. In disaggregated rock where surface area is high, a few percent of pyrite can cause pH, locally, to fall by several units.

The West Squaw Creek drainage contains examples of naturally high rates of weathering and erosion, as well as mining-induced high rates of weathering. Both affect surface water composition, which locally affect the health, abundance, and diversity of aquatic life. The

effects of mining-induced contamination and natural water quality on aquatic life in West Squaw Creek, may be inseparable.

In summary, West Squaw Creek is impaired due to discharges of ARD from sources that include several historic abandoned mines and naturally occurring non-point source discharges. This ARD is very acidic and contain high levels of metals that are acutely and chronically toxic to most aquatic life, particularly fish. Remedial activities using BMPs in compliance with regulatory actions of the RWQCB during the last 30 years have significantly reduced the loading of metals from such discharges. Further reduction in discharges from point and non-point sources is not feasible using current technologies. Even if all point sources were controlled, discharges from human-induced and naturally occurring non-point sources would continue to impair West Squaw Creek to the extent that it would not support the beneficial uses of WARM, COLD, and SPWN as currently defined.

In its most recent triennial review of the Basin Plan, as required by the CWA, the RWQCB identified the need to further develop solutions to water quality regulation problems associated with ARD and mine remediation. The focus of this document and the associated Use Attainability Analysis (UAA) is to evaluate the existing water quality in West Squaw Creek, determine if current beneficial use designation are appropriate, determine whether stream specific changes to the currently applicable objectives for these parameters are appropriate, and, if so, propose and technically support such changes. This is consistent with the RWQCB's basin planning priority.

7.3.10 Other Public Agencies Whose Approval Is Required

- State Water Resources Control Board
- Office of Administrative Law
- United States Environmental Protection Agency

7.4. Environmental Factors Potentially Affected

The environmental resource categories identified below are analyzed herein to determine whether the Proposed Project would result in adverse impacts to any of these resources. None of the categories below are checked because the Proposed Project is not expected to result in "significant or potentially significant impacts" to any of these resources.

- | | |
|--|---|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Biological Resources |
| <input type="checkbox"/> Hazards & Hazardous Materials | <input type="checkbox"/> Mineral Resources |
| <input type="checkbox"/> Public Services | <input type="checkbox"/> Utilities/Service Systems |
| <input type="checkbox"/> Agriculture Resources | <input type="checkbox"/> Cultural Resources |
| <input type="checkbox"/> Hydrology/Water Quality | <input type="checkbox"/> Noise |
| <input type="checkbox"/> Recreation | <input type="checkbox"/> Mandatory Findings of Significance |
| <input type="checkbox"/> Air Quality | <input type="checkbox"/> Geology/Soils |

☐ Land Use Planning

☐ Transportation/Traffic

On the basis of this initial evaluation:

☒ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.¹

☐ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the Project have been made by or agreed to by the Project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the Proposed Project MAY have a “potentially significant impact” or “potentially significant unless mitigated” impact on the environment, but at least one effect: 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

Signature _____

Date _____

Printed Name For _____

¹. As noted in Section 9.1 above, this chapter includes the report required by 23 Cal. Code Regs. § 3777 in lieu of an environmental impact report or negative declaration.

7.5. Evaluation Of Environmental Impacts

- 1) A brief explanation is required for all answers except “No Impact” answers that are adequately supported by the information sources a lead agency cites in the parentheses following each question. A “No Impact” answer is adequately supported if the referenced information sources show that the impact simply does not apply to Project’s like the one involved (e.g., the Project falls outside a fault rupture zone). A “No Impact” answer should be explained where it is based on Project-specific factors as well as general standards (e.g., the Project will not expose sensitive receptors to pollutants, based on a Project-specific screening analysis).
- 2) All answers must take account of the whole action involved, including off-site as well as on-site, cumulative as well as Project-level, indirect as well as direct, and construction as well as operational impacts.
- 3) Once the lead agency has determined that a particular physical impact may occur, then the checklist answers must indicate whether the impact is potentially significant, less than significant with mitigation, or less than significant. “Potentially significant Impact” is appropriate if there is substantial evidence that an effect may be significant. If there are one or more “Potentially Significant Impact” entries when the determination is made, an EIR is required.
- 4) “Negative Declaration: Less Than Significant With Mitigation Incorporated” applies where the incorporation of mitigation measures has reduced an effect from “Potentially Significant Impact” to a “Less than Significant Impact.” The lead agency must describe the mitigation measures, and briefly explain how they reduce the effect to a less than significant level (mitigation measures from Section XVII, “Earlier Analysis,” may be cross-referenced).
- 5) Earlier analyses may be used where, pursuant to the tiering, program EIR, or other CEQA process, an effect has been adequately analyzed in an earlier EIR or negative declaration. Section 15063 (c)(3)(D). In this case, a brief discussion should identify the following:
 - a) Earlier Analysis Used. Identify and state where they are available for review.
 - b) Impacts Adequately Addressed. Identify which effects from the above checklist were within the scope of and adequately analyzed in an earlier document pursuant to applicable legal standards, and state whether such effects were addressed by mitigation measures based on the earlier analysis.
 - c) Mitigation Measures. For effects that are “Less than Significant with Mitigation Measures Incorporated,” describe the mitigation measures which were incorporated or refined from the earlier document and the extent to which they address site-specific conditions for the Project.

- 6) Lead agencies are encouraged to incorporate into the checklist references to information sources for potential impacts (e.g., general plans, zoning ordinances). Reference to a previously prepared or outside document should, where appropriate, include a reference to the page or pages where the statement is substantiated.
- 7) Supporting Information Sources: A source list should be attached, and other sources used or individuals contacted should be cited in the discussion.
- 8) This is only a suggested form, and lead agencies are free to use different formats; however, lead agencies should normally address the questions from this checklist that are relevant to a Project's environmental effects in whatever format is selected.
- 9) The explanation of each issue should identify:
 - a) The significance criteria or threshold, if any, used to evaluate each question; and
 - b) The mitigation measure identified, if any, to reduce the impact to less than significance.

The Environmental Checklist has been prepared in compliance with the requirements of CEQA relating to certified regulatory programs. A statement of facts, supportive discussions, and/or confirming data support each finding of the checklist (see Evaluation of Potential Environmental Impacts).

7.5.1 Environmental Checklist

The Environmental Checklist is provided on the following pages.

7.5.1.1 Aesthetics

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect on a scenic vista?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.2 Air Quality

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Conflict with or obstruct implementation of the applicable air quality plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Expose sensitive receptors to substantial pollutant concentrations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create objectionable odors affecting a substantial number of people?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.3 Agricultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.4 Biological Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.5 Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Disturb any human remains, including those interred outside of formal cemeteries?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.6 Geology & Soils

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ii) Strong seismic ground shaking?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iii) Seismic-related ground failure, including liquefaction?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
iv) Landslides?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in substantial soil erosion or the loss of topsoil?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.7 Hazards & Hazardous Materials

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.8 Hydrology & Water Quality

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Otherwise substantially degrade water quality?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
j) Inundation by seiche, tsunami, or mudflow?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.9 Land Use Planning

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Physically divide an established community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.10 Mineral Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.11 Noise

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
without the project?				
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.12 Population & Housing

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.13 Public Services

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Fire protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Police protection?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Schools?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Parks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Other public facilities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.14 Recreation

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.15 Transportation/Traffic

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e) Result in inadequate emergency access?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Result in inadequate parking capacity?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.1.16 Utilities & Service Systems

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
e) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
g) Comply with federal, state, and local statutes and regulations related to solid waste?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.5.2 Mandatory Findings Of Significance

The required Mandatory Findings of Significance have been reviewed and are outlined below.

Findings:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

7.6 Environmental Impacts Of The Proposed Project

Each resource category of the CEQA Checklist is supported by the following discussions and source information, as cited.

7.6.1 Aesthetics

The proposed project would modify listed beneficial use for warm and cold Freshwater Habitat (WARM and COLD) to exclude fish and other metal or pH sensitive aquatic species, and remove the designated, but not existing beneficial use for spawning (SPWN) (as defined in the Basin Plan) in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment.

Approval and implementation of the proposed change would not result in measurable changes in current conditions in West Squaw Creek or downstream water bodies, relative to existing conditions. The proposed project would not change downstream flows and water quality would remain unchanged, relative to existing conditions, all upstream factors remaining constant. The proposed changes in West Squaw Creek are protective of the creek's current beneficial uses.

Overall, the proposed Basin Plan amendments would have **no impact** to West Squaw Creek aesthetics, because the proposed amendments would result in no change to current conditions to West Squaw Creek itself. Shasta Lake (to which West Squaw Creek is tributary) and other downstream water bodies would also not be impacted.

7.6.2 Agricultural Resources

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. Approval and implementation of the proposed changes would not result in measurable changes in West Squaw Creek or downstream water bodies, relative to existing conditions. Existing conditions in West Squaw Creek are not adversely affecting agricultural resources.

No agricultural resources, including farmland irrigation and livestock watering, would be affected by the proposed project. Overall, the proposed Basin Plan amendments would have **no impact** on agricultural resources of West Squaw Creek or downstream water bodies.

7.6.3 Air Quality

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove spawning (SPWN) in the portion of West Squaw Creek from the confluence of the Early Bird tributary

to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. Because pH, copper, zinc, and cadmium do not affect air quality directly, there would be no direct impacts from the proposed project on air quality. Because implementation of the proposed project would not involve any construction-related activities that would generate increased concentrations of pollutants, objectionable odors, or obstruct the implementation of any air quality plan, there would be no secondary impacts from the proposed project on air quality. The proposed Basin Plan amendments would, therefore, have **no impact** on air quality.

7.6.4 Biological Resources

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The current water quality and beneficial uses in West Squaw Creek will protect existing biological resources. Because the proposed amendments represent current conditions, no adverse affects to existing riparian vegetation, terrestrial organisms, or any other non-aquatic biological resource outside of current baseline impacts is anticipated. As for aquatic life uses, because the proposed action would not change the baseline conditions in West Squaw Creek, no impacts will occur.

In summary, based on the available technical information, the proposed changes to beneficial uses would be protective of the creek's current aquatic life and, therefore, would have **no impact** to existing biological resources.

7.6.5 Cultural Resources

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would not involve any action or activity that would cause an adverse change in historical, archaeological, or paleontological resources, or human remains (such as exposure, destruction, etc). The proposed Basin Plan amendments would have **no impact** on cultural resources.

7.6.6 Geology and Soils

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would not involve any action or physical activity (e.g., construction) that would expose people or structures to the risk of loss, injury, or death involving: a known

earthquake fault, strong seismic ground shaking, seismic related ground failure, or landslides. Also, the proposed change would not involve any action or result in any changing of hydrological regimes that would expose people or structures to increased soil erosion, unstable soil, or expansive soil. The proposed Basin Plan amendments would have **no impact** on geology or soils.

7.6.7 Hazards and Hazardous Materials

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. No changes, other than remedial actions, to physical facilities or operations at the mine sites would be required under the proposed project. The proposed project would not involve the introduction of new hazards or any action or physical activity that would introduce or remove hazardous materials unrelated to mine remedial activities. The proposed Basin Plan amendments would have **no impact** on current or potential hazards or hazardous materials.

7.6.8 Hydrology

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. Approval and implementation of the proposed action would have no direct effect on West Squaw Creek hydrology, relative to existing conditions. Existing creek hydrology is not adversely affecting the creek's aquatic communities, or other beneficial uses. In addition, anticipated creek hydrology under the proposed changes would be identical to creek hydrology under compliance with the current Basin Plan.

Additionally, the proposed project would not affect erosion or siltation rates, existing drainage pattern of the site or area, or the amount of area runoff. The proposed project would not change the 100-year flood magnitude or route; expose people or structures to significant risk of loss, injury, or death involving flooding; or increase the potential for inundation by seiche, tsunami, or mudflow.

The proposed Basin Plan amendments would have **no impact** on hydrology of West Squaw Creek or downstream water bodies.

7.6.9 Land Use and Planning

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The

proposed project would not involve any action, physical activity, or land use change that would divide any established community, conflict with any land use plan, policy or regulation, or conflict with any habitat conservation plan or natural community plan. The proposed Basin Plan amendments would have **no impact** on land use and planning.

7.6.10 Mineral Resources

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species,, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would not involve any action or physical activity that would result in the loss of any known mineral resource or known mineral resource site. The proposed Basin Plan amendments would have **no impact** on mineral resources.

7.6.11 Noise

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The project would not involve any action or physical activity (e.g., construction) that would result in increased noise levels or exposure of people to noise. The proposed Basin Plan amendments would have **no impact** on noise.

7.6.12 Population and Housing

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The immigration of people to an area is typically influenced by such factors as job opportunities, affordable housing, quality schools and public services, and aesthetic quality, among others. Water quality objectives will not encourage or discourage people from moving to the West Squaw Creek area. Also, since the project involves no action or physical activity associated with land conversions, no housing would need to be relocated or otherwise affected. Implementation of the proposed Basin Plan amendments would have **no impact** on population or housing.

7.6.13 Public Services

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The

proposed project would not involve any action that would adversely affect fire protection, police protection, schools, parks, or any other public facility. The proposed Basin Plan amendments would have **no impact** on public services.

7.6.14 Recreation

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would have **no impact** on existing or probable future recreational facilities in that no new structures or alterations of existing facilities or land uses are proposed.

7.6.15 Transportation/Traffic

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would not involve any action that would affect amounts of traffic or congestion, road management, traffic patterns, traffic hazards, emergency access, parking, or current transportation policies. The proposed Basin Plan amendments would have **no impact** on transportation or traffic.

7.6.16 Utilities and Service Systems

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed project would not involve any action that would affect the current regulations or utilities or the need for new utilities. The proposed Basin Plan amendments would have **no impact** on utilities and service systems.

7.6.17 Water Quality

The proposed project would modify listed beneficial uses of West Squaw Creek for WARM, COLD to exclude fish and other metal or pH sensitive aquatic species, and remove SPWN in the portion of West Squaw Creek from the confluence of the Early Bird tributary to the confluence with Shasta Lake through approval of the proposed Basin Plan amendment. The proposed Basin Plan amendments would have **no impact** to baseline/existing water quality and beneficial uses. As additional remedial technologies are developed, future actions may be taken to improve water quality conditions. Point and non-point source discharges in the watershed will continue to be regulated by NPDES permits that require protection of remaining beneficial uses of West Squaw Creek and downstream water bodies.

7.7 Cumulative Impact Analysis For The Proposed Project

Cumulative impacts refer to one or more individual effects which, when taken together, are considerable or which compound or increase other environmental impacts. Such effects result from the incremental impact of a project when added to other closely related past, present, and reasonably foreseeable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

Downstream environmental resources of West Squaw Creek include Shasta Lake and the Sacramento River. These waterbodies are already cumulatively impacted by discharges of ARD from abandoned mines in other watersheds of the West Shasta Mining District. The Sacramento River and the West Squaw Creek arm of Shasta Lake are currently listed as impaired water bodies under section 303(d), CWA and have or are scheduled for total maximum daily load (TMDL) allocations for metals. RWQCB staff is evaluating the opportunity for additional changes to beneficial uses or setting of site-specific objectives for other mine areas of the West Shasta Mining District. There is no anticipated circumstance where impacts of ARD could cumulate and impact resources in the West Shasta Mining District worse than current conditions, as all proposed amendments would be protective of existing beneficial uses. There are no circumstances that can reasonably be forecast for the unique combination of environmental conditions in the affected area under which the combination of metals would collectively cause a significant adverse cumulative impact to West Squaw Creek aquatic life or any other environmental resource.

The proposed project would not have an incremental effect or a cumulatively considerable incremental effect on identified resources in light of any development projects.

7.8 Alternatives Evaluated

This section summarizes remedial options for ARD that have been evaluated by the RWQCB and MRRC for use in the West Squaw Creek drainage to help meet water quality objectives. Current BMPs and BAT, as well as experimental options, are also reviewed in this section for compliance, effectiveness, possible impacts, implementation, and cost for each area in the drainage. This section summarizes BAT and BMP remedial alternatives that have been considered by the RWQCB and MRRC to address ARD in the West Squaw Creek watershed. These alternatives are reviewed in this section for effectiveness, implementation, and cost. For the purposes of this evaluation, point source BAT and non-point source BMPs, are collectively referred to as BMPs.

In general, these BMPs are divided into hydrologic controls, passive treatment, and active treatment. Often, incorporation of only one BMP will solve a particular problem. Sometimes, several BMPs must be incorporated. A practical summary of BMPs for sulfide mines is presented in a publication by the Colorado Division of Minerals and Geology, "Best Practices in Abandoned Mine Land Reclamation: the remediation of past mining activities" (2002). A more generic evaluation of mining BMPs is "Abandoned Mine Site

Characterization and Cleanup Handbook (EPA 910-B-00-001). A BMP flow diagram is also included in the Basin Plan (SWRCB, 1979).

Hydrologic controls are generally considered preventive measures, as the goal of these BMPs is to inhibit acid formation or heavy metal dissolution. If hydrologic controls minimize or eliminate water from entering the mine or coming into contact with sulfide rocks, waste rock or tailings, they may eliminate the cause of the problem. For the purpose of this evaluation, bulkhead seals are included as a hydrologic control because they

- Reduce portal discharge and
- Minimize acid formation and heavy metal dissolution by flooding the mine workings.

Passive treatment generally refers to a range of drainage treatment techniques that do not require continuous electrical or chemical inputs or frequent maintenance. These methods do not eliminate the cause of the problem, but in many cases, may be the only feasible alternative to address the problem.

- Hydrologic Controls
 - Bulkhead Seals
 - Diversion Ditches
 - Stream Diversion
 - Waste Rock/Tailings Removal and Consolidation
 - Erosion and Infiltration Control by Grading
 - Revegetation
 - Capping
- Passive Treatment
 - Aeration and Settling Ponds
 - Sulfate Reducing Wetlands
 - Oxidation Wetlands
 - Other Innovative BMPs to Treat ARD
- Active Treatment

Remedial actions at the West Squaw Creek mines have focused primarily on hydrologic controls to minimize the production of ARD. Where necessary, passive treatment alternatives have also been employed to reduce residual ARD contamination. In general, these activities were implemented in accordance with a feasibility study prepared by MRRC (Adrian Brown, 1997) and as required by the applicable NPDES permit.

Steep unstable and inaccessible topography and lack of utilities continue to be the primary deterrents to the use of remaining BAT/BMP technologies at the MRRC mines in the West Squaw Creek Drainage. MRRC continues to expend research funding on university

experimental projects and has initiated a number of pilot test projects. Table 7-1 presents a comparison of the feasibility of remediation technologies.

<p align="center">Table 7-1 SUMMARY FEASIBILITY ANALYSIS OF BAT/BMP ALTERNATIVES</p>		
Technology	Feasibility in WSC	Comment
Underground Working Alternatives		
Portal Sealing	High	Accessible portals and those with year-round flows are sealed.
Mine Backfilling: Mine Plugging	Cost Prohibitive	Unproven technology. Prohibitive expense for mine volumes considered.
Injection of Neutralizing Materials	Not Effective	Lime treatment tested at two MRRC mines. Results short duration only – no long-term remedial results.
Injection of Organic Matter	Not Proven	MRRC has been funding research in this area for the past three years. In-field project studies have been effective. The treatment is being tested at the Stowell Mine with injection occurring in Summer, 2002.
Pipe ARD to Iron Mountain Treatment	Low	Issues include interfering with a CERCLA remedy, treatment plant operator liability, cost/benefit to treatment plant operator
Reclamation of Waste Rock		
Regrading Waste Rock	Not/Due to Steep Terrain	Accessible dumps have been consolidated and capped. Remaining waste rock dumps are inaccessible, the technology is not available to move them, or there is a lack of area for consideration.
Vegetation of Waste Rock Piles	Not	Not applicable to type of ARD problems at mine.
Cover Technologies		
Submerged Disposal	Not	Not feasible in mountainous topography.
Impermeable Barriers	Not	Not feasible in mountainous topography.
Capillary Barrier Covers	Not	Not feasible in mountainous topography.
Stabilization		
Admixture	Not	Not feasible on mountainous, steep terrain.
Isolation	High/Not	Completed where feasible. Mountainous topography limits remaining area where consolidation and capping may work.
Chemical Stabilization	Not	Inability to meet retention time requirements in steep terrain.
Bactericides	Not	Not a permanent solution to ARD. Public opposition to use.
Surface Water Reclamation		
Surface Water Diversions	High	Completed where access allows.
Wetland Treatment System		
Aerobic Wetlands	Low	Steep topography limits areas available for treatment cells.
Anerobic Wetlands	Moderate	Steep topography limits areas available for treatment cells. MRRC currently operates one cell that treats approximately 30 gpm.
Passive Treatment System	Moderate	Passive treatment systems have been installed in surface water channels at the mine sites beginning in the mid 1980s. High winter flows, unstable soils, and steep topography have rendered installed systems useless.
Active Treatment System	Moderate	Remote locations. No power, water, or access to most areas make these systems infeasible. The high cost of operation for flows at the site contributed to infeasibility.

Alternatives evaluated in this staff report include:

7.8.1 Alternative 1 – No Action

Under this alternative, the current Basin Plan designated, but not existing beneficial uses for WARM, COLD (including fish and other metal or pH sensitive aquatic species), and the designated, but not existing use for SPWN would remain unchanged and would continue to apply to West Squaw Creek. The Water Quality Objectives for the Upper Sacramento River for Cadmium, Copper and Zinc would continue to apply to West Squaw Creek.

7.8.2 Alternative 2 – Adopt Interim Beneficial Uses

Under this alternative, the beneficial use for WARM, COLD, would be modified to exclude fish and other metal or pH sensitive aquatic species, and the designated, but not existing use for SPWN would be removed and the geographical applicability of the Trace Element Water Quality Objectives for Cadmium, Copper, and Zinc for the Upper Sacramento River would be limited for a indefinite period of time until remedial activities could be implemented to improve water quality to the point where the designated beneficial uses could be obtained. This would require all sources of acid rock drainage, both human caused and natural sources, to be reduced to the point where the concentrations of cadmium, copper, and zinc in West Squaw Creek meet the Basin Plan Objectives for receiving waters.

7.8.3 Alternative 3 – Adopt Permanent Changes to Beneficial Uses

Under this alternative, the beneficial use for WARM, COLD would be modified to exclude fish and other metal or pH sensitive aquatic species, and the designated, but not existing use for SPWN would be permanently removed. The geographic applicability of the Trace Element Water Quality Objectives for Cadmium, Copper, and Zinc would not apply to West Squaw Creek from the Early Bird Tributary to Shasta Lake.

7.9 Recommended Alternative

Alternative 3 is the recommended alternative since the action would:

1. Be consistent with state and federal water quality laws and policies;
2. Is protective of current and post 1975 beneficial uses;
3. Recognize that the technology does not currently exist, nor is it likely to exist in the foreseeable future, to remove the impacts of acid rock drainage to the degree where the subject beneficial uses could exist,

4. Allow the RWQCB to reasonably address regulatory issues associated with abandoned mine site remediation and to focus remedial efforts on other, more significant sources of metal loading to Shasta Lake and the Sacramento River,
5. Allow responsible parties to focus their efforts on other, more significant point and non-point sources of ARD impacted waterbodies tributary to Shasta Lake where the efforts will result in more significant reductions in metal loading to Shasta Lake and the Sacramento River.

Adoption of Alternative 1 (No Action) would not result in demonstrable benefits to improve water quality and reduce metal loading to West Squaw Creek, and would be inconsistent with the current science regarding control of ARD. Moreover, it would not resolve the current regulatory issue associated with ARD impacted streams and would result in the expenditure of resources that could be more effective in reducing metal loading to Shasta lake and the Sacramento River if applied on other impacted tributaries to Shasta Lake. Alternative 2, implementation of interim beneficial uses would not be appropriate as there is no technology known to be available in the foreseeable future that will result in the reduction of ARD to allow West Squaw Creek to support the beneficial uses.

Based on the analysis of the proposed project and each of the three options under the Alternatives Evaluation presented above, RWQCB staff recommends approval and implementation of the Proposed Project.

7.10 De Minimis Finding

The RWQCB staff, after consideration of the evidence, recommends that the RWQCB find that the proposed project has no potential for adverse effect, either individually or cumulatively on wildlife.

8. REFERENCES

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APPENDIX A

RECOMMENDED FORMAT FOR COMMENT LETTERS

Comment letters to the Regional Board on staff recommendations serve two purposes: (1) to point out areas of agreement with staff recommendations; and (2) to suggest revisions to staff recommendations. Clear statements of both areas of agreement and suggested revisions will assist the Regional Board and staff in understanding the recommendations of the commenter. The California Environmental Quality Act requires staff to respond to those comments submitted by the public which suggest revisions to staff recommendations, as long as those comments concern revisions to the Basin Plan Amendment. In order to aid staff in identifying suggested revisions and to respond to the specific concerns of the commenter, the following format for comment letters is suggested.

FORMAT FOR COMMENTS SUGGESTING REVISIONS

The suggested format is to number to the comment, state in one sentence the topic upon which the comment is directed, provide a supporting argument, and make a recommendation. Supporting arguments which include citations will assist staff in considering the comment. Below is an example. The Environmental Action Team (EAT) recommends the following revision to staff recommendations:

1. Proposed Xenon objective for Slug Slough

Staff has recommended a 0.001 ng/L Xenon objective to protect resident guppies in slug Slough. The U.S. EPA Xenon criteria for protection of guppies in fresh waters is currently 0.0001 ng/L – an order of magnitude lower than the staff recommendation. The U.S. EPA criteria is supported by several studies in peer reviewed journals (e.g., Smith and Jones; J. Env. Qual. (1994); Johnson; J. Env. Qual. (1995)). Staff arguments that the cost of analyzing for Xenon in water below 0.001 ng/L is prohibitive does not support the adoption of a water quality that is not protective of beneficial uses. More cost effective analytical procedures may be developed in response to the need for more intensive Xenon analysis. EAT, therefore, strongly recommends the adoption of a 0.0001 ng/L Xenon objective to fully protect guppies in Slug Slough.

FORMAT FOR COMMENTS SUPPORTING STAFF RECOMMENDATIONS

If the commenter concurs with a staff recommendation, a statement to that effect will assist the Regional Board in determining what action, if any, to take on the staff recommendation. In general, no supporting discussion need be presented, unless the commenter feels that the staff recommendation could be further enhanced or clarified. Below is an example.

1. Proposed Neon objective for Slug Slough

EAT strongly supports the adoption of the 0.05 pg/L Neon objective proposed by staff for Slug Slough. In addition to arguments presented by staff, it should be pointed out that Harrison's recent work on goldfish (Harrison, et al, 1996) confirms the appropriateness of the proposed objective for the protection of fresh water aquatic life.